

AUTOMOTIVE INDUSTRIES

A C H I L T O N P U B L I C A T I O N

NOVEMBER 15, 1959

Features • • •

**RADIOISOTOPES
ADVANCE IN
AUTOMOTIVE USES**

**COMPLETELY NEW
GMC TRUCKS**

**BODY ENGINEERS
ANNUAL CONVENTION**

**CONFERENCE
OF THE ASA**

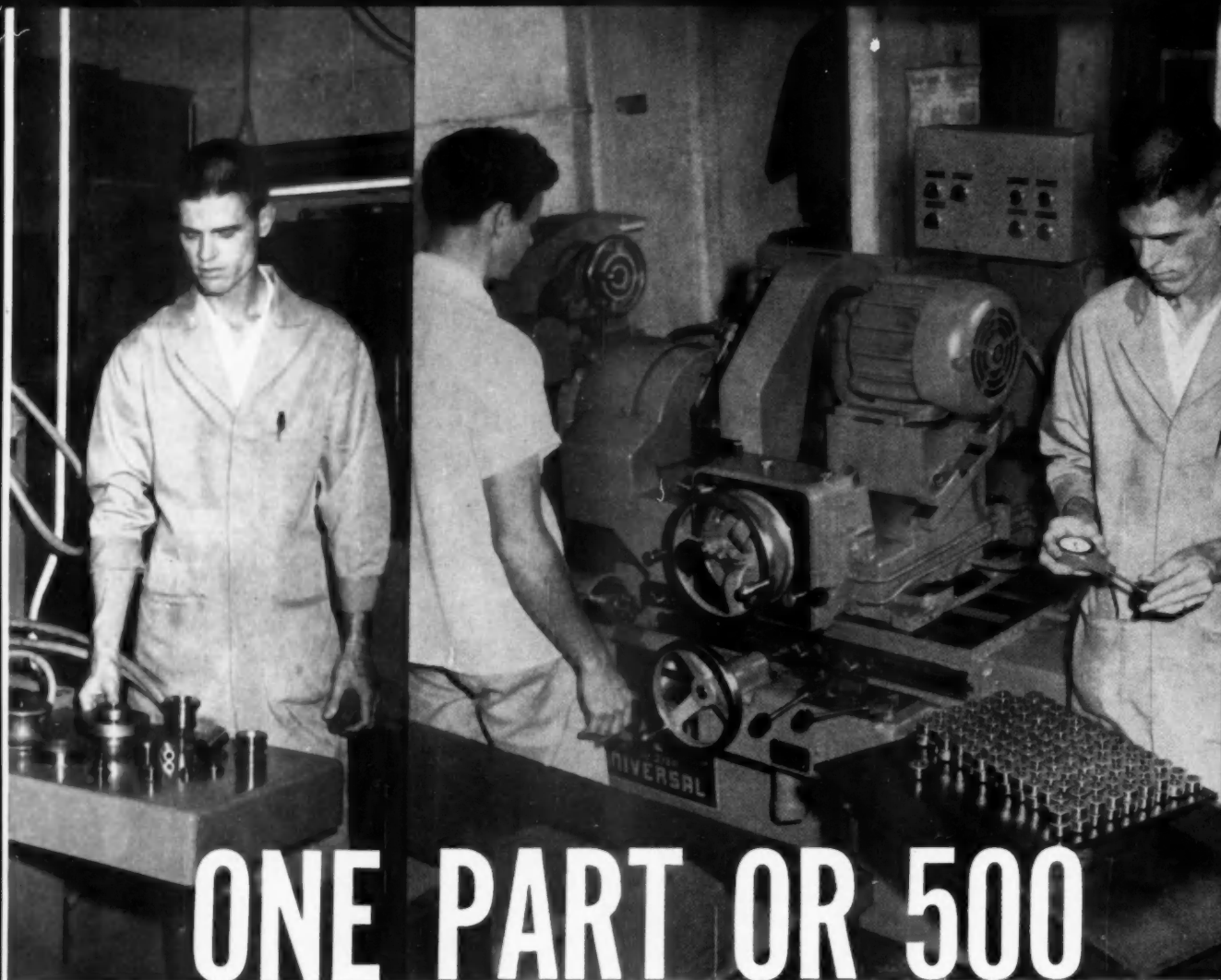
radioisotopes ►

Crankshafts Being Prepared for
Radiographic Inspection in Dan-
ville Plant of Central Foundry
Division of GM

PAGE 3



**ENGINEERING
MANAGEMENT • DESIGN • PRODUCTION**



ONE PART OR 500

*Selco gets top grinding performance
at rock-bottom cost with the*

NEW HEALD MODEL 273A UNIVERSAL

The Heald Model 273A Universal Internal Grinder shown above is installed at the Selco Grinding Company — a small but busy job shop in southern California. Here it is used to grind straight or tapered I.D.s and O.D.s, and for rotary surface grinding of flat, convex or concave surfaces of a wide range of work — from individual parts to production runs. And it easily handles every job with far greater speed, accuracy, precision and finer finish than could be obtained on any of their previous equipment.

Until the advent of this Universal Grinder, most small job shops (and many larger ones, too) couldn't afford a machine of this type. But the Heald 273A

costs about *half* as much as comparable machines today, and less than similar machines (with fewer features) cost in 1947!

Incorporating the latest advances in the grinding art, it holds tolerances to within .0001" in routine production, and within .000050" in special cases. Features include hydrostatic antifriction ways, full 20" table travel, several wheelhead positions, infinitely variable workhead speed from 150 to 450 rpm and 90 degree workhead swivel for rotary surface grinding.

Ask your Heald engineer for information on the New 273A — the only completely new machine with 1959 performance and a 1947 price tag.

THE HEALD MACHINE COMPANY

Subsidiary of The Cincinnati Milling Machine Co.

Worcester 6, Massachusetts

Chicago • Cleveland • Dayton • Detroit • Indianapolis • Lansing • New York • Philadelphia • Syracuse



*It PAYS
To Come
To Heald*

(Advertisement)

KNOW YOUR ALLOY STEELS . . .

This is one of a series of advertisements dealing with basic facts about alloy steels. Though much of the information is elementary, we believe it will be of interest to many in this field, including men of broad experience who may find it useful to review fundamentals from time to time.

How Heat-Treatment Affects Alloy Steels

Heat-treatment may be defined as an operation or series of operations involving the heating and cooling of steel in the solid state to develop the required properties. There are in general five different forms of heat-treatment used with alloy steel. These treatments modify the mechanical properties of the steel to suit the end use.

The five forms of treatment mentioned above, as applied to constructional alloy steels, are discussed in the following paragraphs:

(1) *Quenching and Tempering.* This form of heat-treatment usually consists of three successive operations: (a) heating the steel above the critical range, so that it approaches a uniform solid solution; (b) hardening the steel by quenching it in oil, water, brine, or salt; and (c) tempering the steel by reheating it to a point below the critical range in order to effect the proper combination of strength and ductility.

(2) *Normalizing.* A form of treatment in which the steel is heated to a predetermined temperature above the critical range, after which it is cooled to below the range in still air. The purpose of normalizing is to promote uniformity of structure and to alter mechanical properties.

(3) *Annealing.* This method consists of heating the steel to a point at or near the critical range, then cooling at a predetermined slow rate. Annealing is used to soften the steel, to improve machinability, to reduce stresses, to

improve or restore ductility, and to modify other properties.

(4) *Spheroidize-Annealing.* This form of heat-treating requires prolonged heating of steel at an appropriate temperature, followed by slow cooling to produce a globular condition of the carbide. This treatment produces a structure which may be desirable for machining, cold-forming, or cold-drawing, or for the effect it will have on subsequent heat-treatment.

(5) *Stress-Relieving.* This is the process of reducing internal stresses by heating the steel to a temperature below the critical range, and holding for a time interval sufficient to equalize the temperature throughout the piece. The object of this treatment is to restore the elastic properties of the steel, or to reduce stresses that may have been induced by machining, cold-working, or welding.

Each of the five forms of heat-treatment will be the subject of a future advertisement.

Bethlehem metallurgists have had long experience in all methods of heat-treatment. They understand the possibilities and limitations of each method with respect to various alloy steels. These men will be glad to help you with any problems concerning heat-treatment. Feel free to ask for their services.

And call on Bethlehem, too, for the full range of AISI standard alloy steels, as well as special-analysis steels and all carbon grades. We can meet your needs promptly.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.
Export Distributor: Bethlehem Steel Export Corporation

BETHLEHEM STEEL





How **B&W JOB-MATCHED EXTRUSIONS**

can reduce the cost of your finished product

- ... they meet your design and production requirements because the extrusion process can produce a variety of shapes in solid or tubular form
- ... they meet product end-use specifications because you have a choice of high-alloy and stainless steels, or special non-ferrous metals and alloys

... they save production time because operations can often be reduced to a mere cutting to length and a few simple finishing operations. Be sure it's B&W when you specify extrusions. Call your local B&W District Sales Specialist, or write for Bulletin TB-413 for full information. The Babcock & Wilcox Company, Tubular Products Division, Beaver Falls, Pa.



TA-9004-E1

B&W

THE BABCOCK & WILCOX COMPANY

TUBULAR PRODUCTS DIVISION

Seamless and welded tubular products, solid extrusions, seamless welding fittings and forged steel flanges—in carbon, alloy and stainless steels and special metals

AUTOMOTIVE INDUSTRIES

A CHILTON MAGAZINE • PUBLISHED SEMI-MONTHLY

NOVEMBER 15, 1959

Passenger Cars • Trucks • Buses • Aircraft • Tractors
• Engines • Bodies • Trailers • Road Machinery •
Farm Machinery • Parts and Components • Accessories
• Production and Processing Equipment •
Design • Production • Engineering • Management

VOL. 121 No. 10

Features • • •

▼ Radioisotopes Advance in Automotive Engineering Part I

Part I of a two-part article gives definitions and principles of radioisotope applications in the automotive industry. It describes the three most important types of radioisotope equipment—radiography, gaging, and tracers. Page 59

▼ Completely New Line of GMC Trucks

Among the 61 truck models announced for 1960 by General Motors a large number will feature new 60-deg, V-type gasoline engines manufactured by GMC. Page 65

▼ Silicon Rectifiers for A-c Generators

Because of a new silicon rectifier, it will be practical to use a-c rectifier electrical systems on mass-produced passenger cars. An article by Glen Ramsey, of Fanstall Metallurgical Corp., tells how. Page 66

▼ British Motor Show

Production in the automobile industry in Britain is at an all-time high. Many of the new developments for 1960 were on display at the London Motor Show. Page 70

▼ ASBE Holds Annual Convention

Many technical papers of interest to automotive engineers were highlights of the 14th Annual Convention of the American Society of Body Engineers. Page 73

▼ Motor Vehicle Registrations Up for '59

By the end of this year, motor vehicle registrations will show an increase of 3.3 per cent over the total for 1958. This fore-

cast is based on an annual survey conducted by AUTOMOTIVE INDUSTRIES. Page 72

▼ Automotive Developments Linked to Standards at ASA Conference

Standards in automotive manufacturing, fasteners, tooling, material handling, space technology, and the relative merits of the English and metric systems were among the subjects at the National Conference on standards. Page 74

▼ China's Expanding Motor Vehicle Industry

More than 100 types of cars and trucks have been produced in China during the past two years. Page 76

▼ Selected Data of 1960 Passenger Cars

Shown in tabular form are: standard and optional engines offered; overall vehicle dimensions; shipping weights of five-passenger, four-door sedans; and retail prices of the five-passenger, four-door sedans. Page 79

▼ 17 New Product Items, And Other Features, Such As:

News of the Machinery Industries, Government Contract Awards, and Industry Statistics.

... continued on next page

Cover Illustration

Crankshafts being prepared for radiographic inspection by means of a 30 Curie Cobalt 60 unit housed in a special building at the Danville Plant of Central Foundry Division of General Motors Corp. Radiographic inspection is used both to determine the best possible gating prior to production release and to check production castings for internal soundness.

MEMBER



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Business Publications Audit of Circulation

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PAYLOAD! PRICE! PROTECTION!

MAKE BENDIX HYDROVAC® THE MOST POPULAR POWER BRAKE WITH TRUCKERS

Vacuum power braking is the overwhelming choice of truckers, with Bendix Hydrovac leading the field—more than 5½ million sold. The reasons for this popularity are obvious. Hydrovac saves up to several hundred pounds in weight—meaning a bigger payload and profit. Bendix Hydrovac costs less to buy—less

to maintain, and does not rob power from the engine. Bendix Hydrovac assures maximum dependability with built-in standby safety—manual braking available in case of power failure. Any way you look at it, if you build, buy, sell or operate trucks it will pay you to look to Bendix Hydrovac for the best in power braking.

®REG. U.S. PAT. OFF.

More Bendix Hydrovac vacuum power brakes are in use than all other makes

Bendix PRODUCTS
DIVISION South Bend, IND.



protection is stainless steel

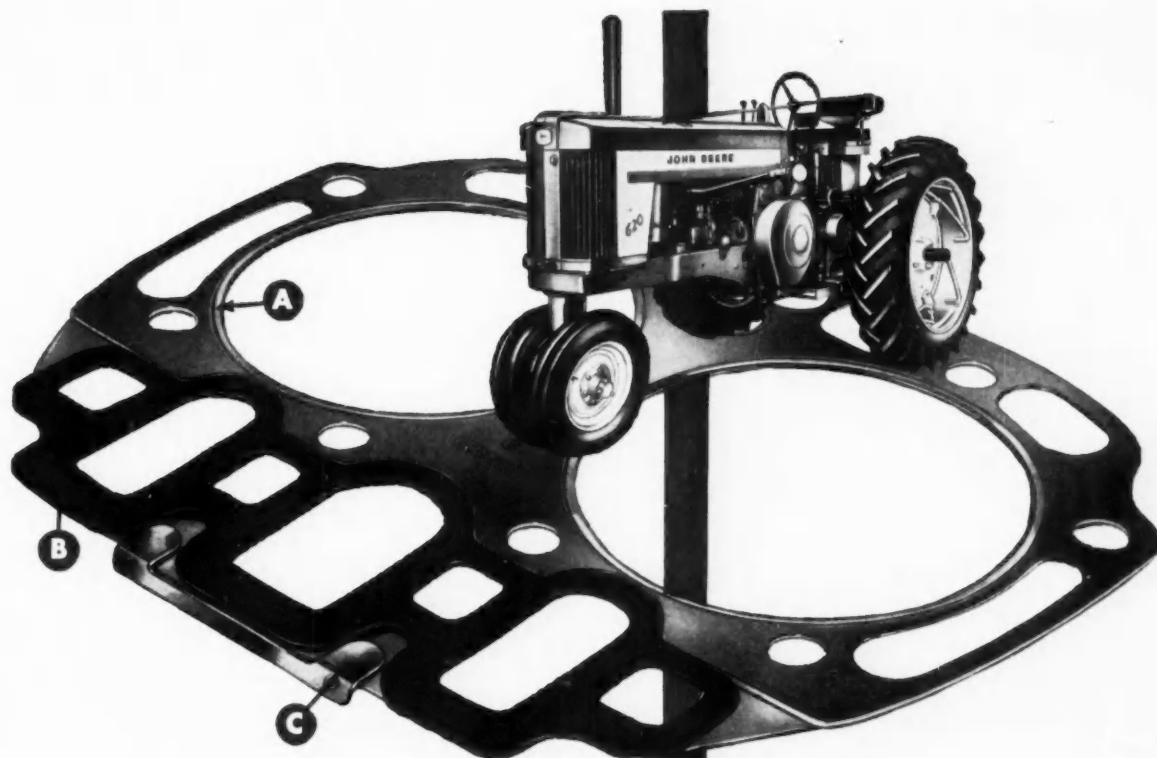
Summer or winter the car with plenty of Stainless Steel is easy to clean and keeps its good looks under the roughest conditions of driving and weather.

No other metal offers the freedom of design and fabrication, economy of care and the durable beauty that serves and sells like Stainless Steel.

McLOUTH STEEL CORPORATION, Detroit 17, Michigan



specify
McLOUTH STAINLESS STEEL
HIGH QUALITY SHEET AND STRIP
for automobiles



How JOHN DEERE seals an intricate block casting

JOHN DEERE engineers assume no limitations on what can be done with gaskets. For example, take the case of sealing the Model 620 tractor engine.

Intricate block design created the problem of effectively sealing the coolant ports beyond the area of stud loading. The seal would have to compensate for heat expansion and shifts of the water holes in the block casting. Compressed thickness and resilience of the gasket overall would have to be balanced to insure maximum sealing of combustion chambers, exhaust, fuel and air ports.

Solution Comes from Standard Design

How JOHN DEERE engineers in cooperation with Victor specialists solved this problem is shown here. This partial modification of the standard VIC-2-FOLD design suggests the flexibility and wide scope of economical sealing service available from Victor.

Whatever you have to seal with gaskets or oil seals, Victor's unmatched facilities are yours to use. Contact your Victor Field Engineer or the factory.

Victor Mfg. & Gasket Co., P.O. Box 1333, Chicago 90, Ill.—Canadian Plant: St. Thomas, Ont.

A → VIC-2-FOLD modern metal-asbestos design insures tight sealing of combustion chambers, exhaust, fuel and air ports. Steel bottom layer, turned up and overlapping copper top layer at combustion openings, gives strong protection against breakdown and blowout. Copper top, turned down and overlapping steel layer, protects against corrosion.

B → VICTOPRENE insert, bonded to steel bottom layer, with overlap on openings, provides tight sealing of coolant chambers. Victoprene was selected for its lowest compression set values.

C → Shim stop of brass, riveted to bottom steel layer, prevents excessive compression on Victoprene insert.



Industry's source of sound sealing ideas for 50 years



VICTOR

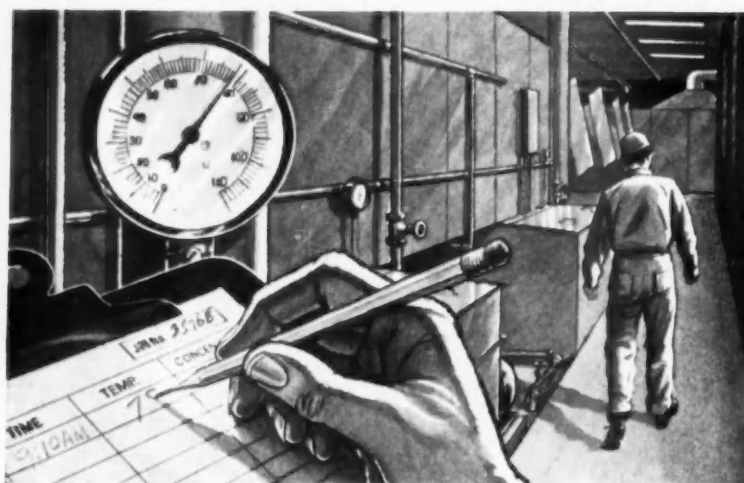
Sealing Products Exclusively

GASKETS • PACKINGS • OIL SEALS • MECHANICAL SEALS

To get the most economical spray washing

ask Oakite

OVER 50 YEARS CLEANING EXPERIENCE • OVER 250 SERVICE MEN • OVER 160 MATERIALS



Oakite ROOM-TEMP cleaner cuts solution heating costs

That's right! Oakite Room-Temp cleaner gives good cleaning results at 70° to 100°F.—the temperature range you find in most industrial cleaning areas. This cleaning efficiency can save you money on steam normally required for heating of cleaning solutions.

Designed primarily for spray-wash machines, Room-Temp cleaner is non-foaming... good for steel, iron, brass, aluminum... has no odor... requires no ventilation.

Room-Temp cleaner provides top rust protection for in-process parts, too. It dries to a thin film that stops corrosion from attacking iron and steel for more than 300 hours at 90% humidity, 100°F.

ASK THE OAKITE MAN to tell you more... or to help you choose from the complete Oakite line a spray-washing material that offers most economy for the parts you're processing. Or, write for application data sheet B-6972. Oakite Products, Inc., 34E Rector Street, New York 6, N. Y.

it PAYS to ask Oakite



CALENDAR

OF COMING SHOWS AND MEETINGS

Packaging Machinery Manufacturers
Institute Show, Coliseum, New
York, N. Y. Nov. 17-20

Ninth Aircraft Hydraulics Confer-
ence, Park Shelton Hotel, De-
troit, Mich. Nov. 18-20

NICB, one-day meeting, Conrad
Hilton Hotel, Chicago, Ill. Nov. 19

NMTBA Annual Meeting, The
Greenbrier, White Sulphur
Springs, W. Va. Nov. 19-21

ASME, annual meeting, Chalfonte-
Haddon Hall, Atlantic City,
N. J. Nov. 30-Dec. 4

Ninth Annual Eastern Joint Com-
puter Conference, Statler-Hil-
ton Hotel, Boston, Mass. Dec. 1-3

Automotive Electric Association,
annual meeting, Edgewater
Beach Hotel, Chicago, Ill. Dec. 4-11

SAE National Meeting, Sheraton-
Cadillac and Statler Hotels, De-
troit, Mich. Dec. 11-15

Material Handling Institute, annual
meeting, Savoy-Hilton Hotel,
New York, N. Y. Dec. 15

Industrial Truck Association, an-
nual meeting, Savoy-Hilton Ho-
tel, New York, N. Y. Dec. 15

1960

AIIME Annual Meeting, Statler-
Hilton and McAlpin Hotels,
New York, N. Y. Jan. 14-18

Chicago Automobile Show, Inter-
national Amphitheatre, Chi-
cago, Ill. Jan. 16-24

National Motor Boat Show, Coli-
seum, New York, N. Y. Jan. 15-24

Plant Maintenance & Engineering
Show, Convention Hall, Phila-
delphia, Pa. Jan. 25-28

AAMA Exposition, Navy Pier, Chi-
cago, Ill. Jan. 25-28

Institute of the Aeronautical Sci-
ences, Hotel Astor, New York,
N. Y. Jan. 25-28

Society of Vacuum Coaters, annual
meeting, Hotel Biltmore, New
York, N. Y. Jan. 26-27

Private Truck Council of America,
annual convention, Roosevelt
Hotel, New York, N. Y. Jan. 28-29

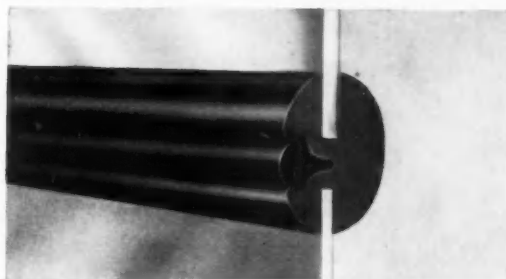
ISA Instrument-Automation Con-
ference and Exhibit, Coliseum,
Houston, Tex. Feb. 1-5



custom designed

and 7 ways best

Specify Inland Self-Sealing Weatherstrip for lowest cost, perfect weatherproofing of fixed windows



Like an original gown, Inland Self-Sealing Weatherstrip is specially designed—solves your weatherproofing problems best in seven ways

1. **Each application** custom designed . . . to your prints or using our standard sections.
2. **Basic seal design** increases pressure to stop leaks.
3. **Filler strip** makes job absolutely leakproof, eliminates special moldings, channels, binders or cement.
4. **Special compounding** maintains sealing pressure, long life.
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6. **One-man installation** in minutes reduces assembly costs.
7. **Replacement** is fast and easy.

The result? Inland Self-Sealing Weatherstrip is the best your money can buy for complete customer satisfaction for any type of fixed window installation.

Write, wire, or phone today about your weatherproofing problems. Catalog on request.



INLAND

SELF-SEALING WEATHER STRIP

Inland Manufacturing Division
General Motors Corporation • Dayton, Ohio



Transportation Industry



Railway Equipment



Off-the-road Equipment



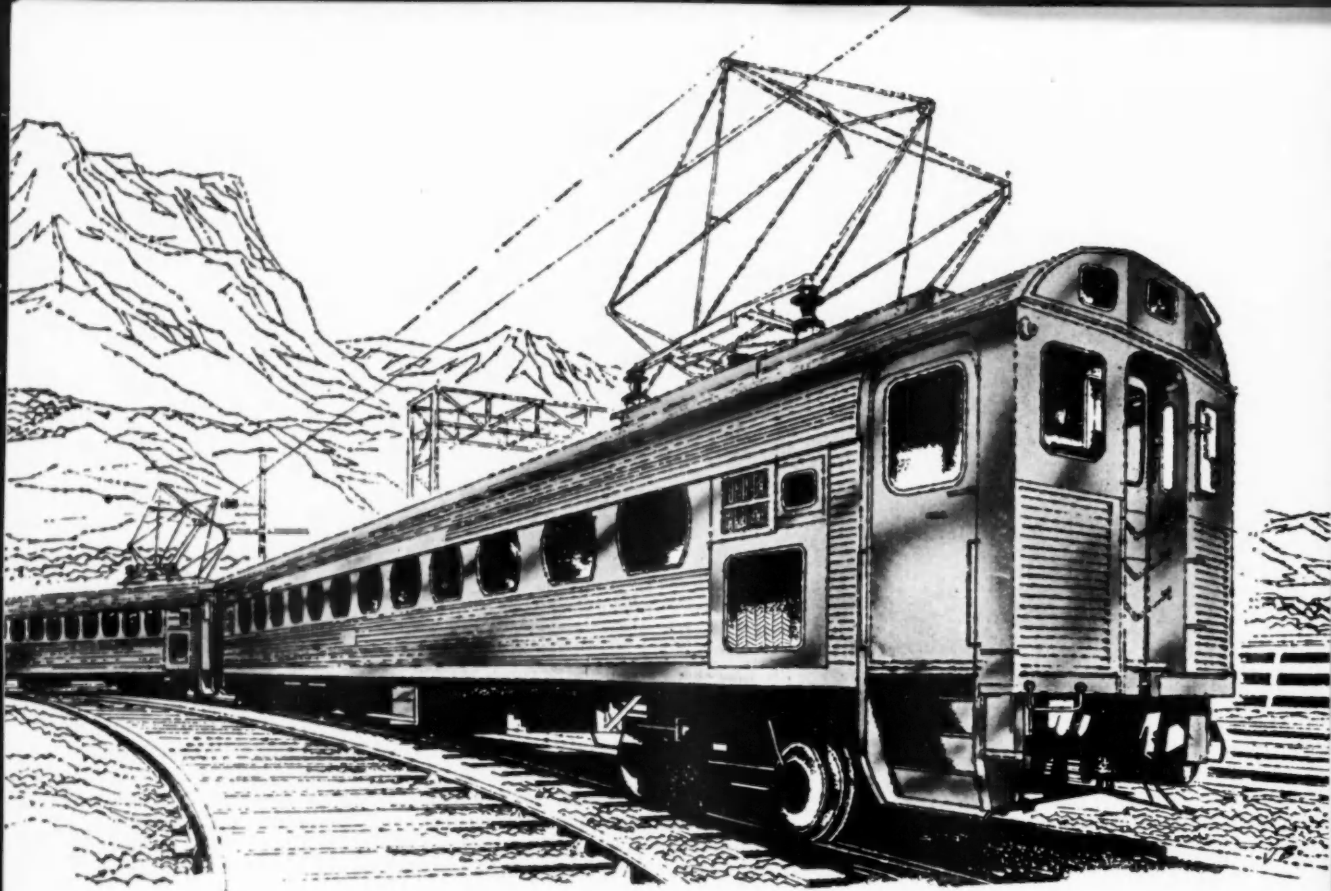
Appliances



Marine Applications



Commercial Structures



Light as a 128-Passenger Feather

Because it makes practical use of the remarkable strength-weight ratio of the austenitic stainless steels, this all-stainless steel railroad passenger car weighs **25 tons less than other so-called modern equipment.**

It is an important contribution to railroad operating economy and efficiency because its stainless steel structure guarantees millions of miles of service between overhauls—its gleaming exterior requires no paint.

Designed and built by The Budd Company, it is considered one of the greatest engineering achievements of the century—made possible **only** by that brawny beauty stainless steel.

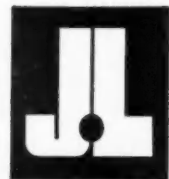
In your product engineering when weight is a problem and strength a necessity the answer can be found in stainless steel's unique combination of strength, durability and beauty.

J&L leads the industry in melt shop standards for stainless steel—the point where quality starts, and engineering achievement begins.



Plants and Service Centers:

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STAINLESS
SHEET • STRIP • BAR • WIRE

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For the Precision of a Count-down



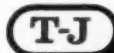
T-J LAUNCHES A NEW CUTTING TOOL LINE FOR MILLING ACCURACY

For precision milling to close tolerances, so vital in today's high-speed, high-production manufacturing, T-J now offers a new, improved line of milling cutters. The new cutter line features a high helix angle, double back-off, and a right-hand spiral to produce more and smoother cuts between grinds, and a free-cutting, stronger tool.

Specially designed and precision-manufactured for die sinking and production milling, the new line is designed to include flats on the shanks for set screw type drivers on all of the end and side milling cutters.

Write today for complete information to the Tomkins-Johnson Company, Jackson, Mich.

Ask for completely new cutter catalogue No. 259.



TOMKINS-JOHNSON

MAKERS OF PRECISION CUTTING TOOLS



Nickel-Chrome Plating Reflects the Quality Appeal of Enduring Beauty

If salt air won't harm the eye-appeal of quality Nickel-Chrome Plating... what will?

De-icing salts? Traffic abrasions? Flying stones and gravel? Freezing temperatures?

All these meet their match in quality Nickel-Chrome Plating... plating with a good, heavy, *duplex* nickel coating underneath.

For this good, *bright*, double-thick nickel coating with a thin surface layer of chromium not only provides the shining beauty your customers see and admire... but it also provides them with *lasting* beauty, and

beauty *easy* to care for. That's because it protects the basis metals from rust and corrosion. It protects new car trim against nicks and scratches.

So with Nickel in ample supply as far into the future as any man can foresee, you can now plan to use *duplex* nickel coatings to get this *double* benefit:

1. to improve the appearance of brightwork... to make it more de-

sirable and salable.

2. to improve brightwork durability to help keep your customers happy, satisfied, *and sold*.

For more information about versatile nickel coatings, write us for our informative booklet, "PRACTICAL ANSWERS TO 40 PRACTICAL QUESTIONS ABOUT NICKEL PLATING."

The International Nickel Company, Inc.
67 Wall Street New York 5, N.Y.

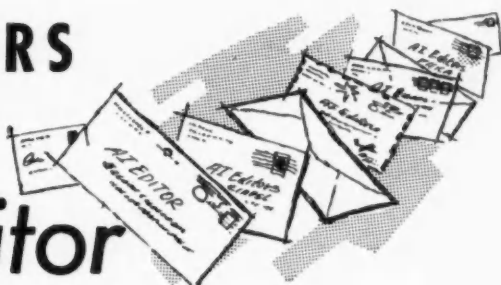


Inco Nickel *makes plating perform better longer*

LETTERS

to the

Editor



Readers' opinions or requests for additional information on material appearing in the editorial pages of AUTOMOTIVE INDUSTRIES are invited for this column. No unsigned letters will be considered, but names will be withheld on request. Address *Letters to the Editor*, AUTOMOTIVE INDUSTRIES, 56th & Chestnut Sts., Philadelphia 39, Pa.

MACHINE TOOLS

I read Mr. King's article in the September 1 issue with a great deal of interest and go along with his thinking on joint cooperation all the way. While we are only an advertising agency and a very small part of the whole picture, I feel that we too can contribute in a small way to cooperative thinking, inasmuch as we think and speak through the printed word for certain machine tool builders.

Fay Keyler
Chairman of the Board
O. S. Tyson and Co., Inc.
230 Park Ave.
New York, N. Y.

The machine tool article in the September 1 issue was most interesting, and I believe that a similar one on materials handling with particular attention to conveyors would be appropriate.

R. C. Sollenberger
Executive Vice-President
Conveyor Equipment Manufacturers Association
One Thomas Circle
Washington 5, D. C.

PETROLEUM

Although we are observing the petroleum Centennial this year, it wasn't until 1901, when Anthony Lucas drilled the spindle top well, that those who had visions of putting America on wheels were assured of an abundant supply of low cost energy. The growth of the automotive and petroleum industries, as we know them, has dated from that time.

Petroleum was hardly a factor in our energy picture at the turn of the century. Today petroleum fuels

account for 70 percent of our energy requirements. The interdependence of the oil and automotive industries is greater than ever. For your information, I am enclosing a policy statement of our organization which outlines to some extent the problems involved in making available adequate future petroleum supplies. It is our feeling that the automotive industry has a substantial stake in these efforts.

Lloyd N. Unsell
Director of Information
Independent Petroleum Association of America
Tulsa, Okla.

AIR CONDITIONING

I would like very much to obtain an article from the June 15 issue entitled "Design Data for Automotive Air Conditioning." Please advise how I may be able to procure a copy of this article and/or a copy of your publication of that date.

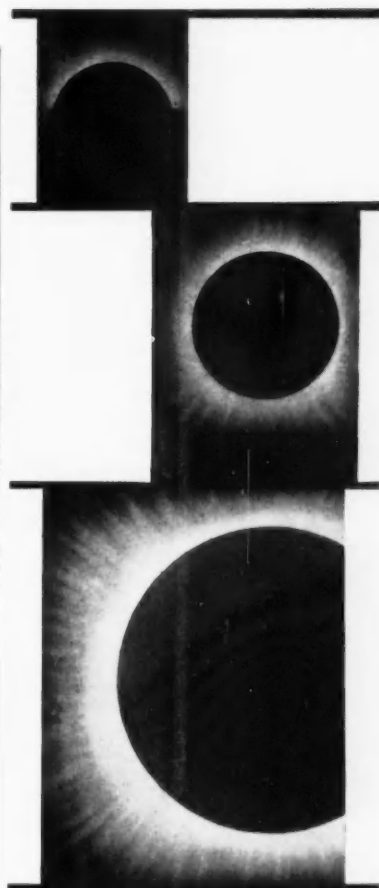
W. H. Anderson
Univair Incorporated
P. O. Box 25
St. Louis 23, Mo.

● Copy is being sent to you.
—Ed.

AI PLAUDIT

We need your kind of full and authoritative reporting on industry developments, and I am glad to see the job so ably done.

Andrew A. Kucher
Vice-President — Engineering and Research
Ford Motor Co.
20000 Rotunda Drive
Dearborn, Mich.



IN FASTENERS SOUTHERN IS RELIABLE

Reliability is the most important product Southern Screw offers its customers. From the receipt of your order through shipment, **reliability** is the important but invisible quality that has built Southern Screw's acceptance over the past twelve years. If **reliability** is one of the unseen but invaluable components of your product, get in touch with Southern Screw about your requirements and our quotation on quality screws shipped on schedule! Write Southern Screw Company, P. O. Box 1360, Statesville, N. C.

Manufacturing & Main Stock in Statesville, N. C.

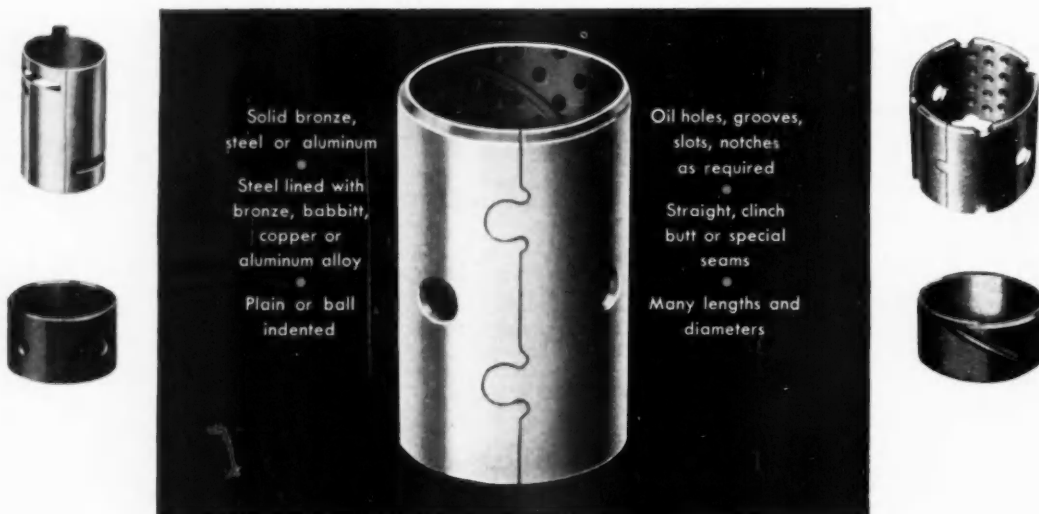
Warehouses:

New York ● Chicago ● Dallas
Los Angeles

Machine Screws & Nuts ● Tapping Screws ● Stove Bolts ● Carriage Bolts
Wood Drive Screws ● Wood Screws
Dowel Screws ● Hanger Bolts



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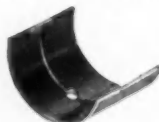


LOW COST BUSHINGS with Bearing Performance!

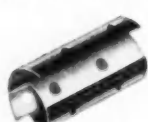
Bimetal bushings, in a variety of alloys on steel, provide bearing load-carrying qualities, *with the advantages of low-cost production*. Quality-controlled manufacturing to your specifications. Complete engineering service. Write:

FEDERAL-MOGUL DIVISION

FEDERAL-MOGUL-BOWER BEARINGS, INC., 11037 SHOEMAKER, DETROIT 13, MICHIGAN



Copper-Alloy Lined



Spacer Tubes



Bearing-Surfaced Thrust Washers



Aluminum or Babbitt Lined



RESEARCH • DESIGN • METALLURGY • PRECISION MANUFACTURING



PHOTO BY KARSH OF OTTAWA

**"Supplier reliability is a must
to sound product development"**—R. W. SWANK, Research and Development,
Smith-Erie Div., A. O. Smith Corp.

"We count Sharon Steel as one of our most dependable suppliers, and this is extremely important to a development engineer," says R. W. Swank, Manager of Research and Development of service station pumps in the Smith-Erie Division of A. O. Smith Corp.

Shown here with P. R. Fishburn, Manager of Manufacturing, Swank points out "If we can design with the knowledge that we need not be concerned about material analysis variation, our jobs are made that much easier. We've found we can expect this kind of supplier reliability from the *Sharon Steel Corporation, Sharon, Pa.*"



SHARON *Quality* **STEEL**

Want to cut costs on parts like these?



Here's how tracing will help you save

The simple, basic setup shown above handles nearly 300 different parts for a well-known manufacturer of drive line components. All work is performed on one Gisholt MASTERLINE No. 4 Ram Type Turret Lathe with a JETracer on the rear of the cross slide. Standard tools on the hex and square turrets are used to face, chamfer and reduce the stock while the JETracer finishes all diameters, steps, blends and radii. The 6 $\frac{3}{16}$ "-long, 2"-diameter stepped shaft (above at left) is typical and is completed in two operations with total f.t.f. time only 4.95 minutes.

Here are just a few things the JETracer can do for you:

- Shorten setup and change-over time
- Simplify machining and eliminate operator errors
- Save cost of form tools, multiple tool blocks and holders
- Reduce inspection time (only one length and one diameter need checking)

Minimize or eliminate secondary operations (through finer finish, greater accuracy)

Increase production through automatic machining of complex surfaces

Free operator to handle extra units or perform other work

Gisholt has developed a complete line of JETracers for use with ram and saddle type turret lathes, automatic turret lathes and single-spindle chucking lathes. These include rear cross slide, turret and independent slide mounted units, single or multi-pass types. *All are designed to operate at full capacity of the machines to which they are applied, without limiting machine functions or restricting the use of standard tools.*

You'll want to see for yourself how the JETracer adds flexibility, speeds operations and cuts costs on standard and problem parts. Send the coupon today for your free copy of the new JETracer catalog, or call your Gisholt Representative for complete information.

GISHOLT

MACHINE COMPANY

Madison 10, Wisconsin

ASK YOUR GISHOLT REPRESENTATIVE ABOUT FACTORY-REBUILT MACHINES WITH NEW-MACHINE GUARANTEE

Gisholt Machine Company
1205 E. Washington Ave.
Madison 10, Wisconsin

Please send a copy of the new Gisholt JETracer catalog.

Name.....Title.....

Company.....

Street address.....

City.....Zone.....State.....



wheel
covers

for the most exacting stainless
application on the American automobile

of **Superior**

STAINLESS STRIP STEEL

Spinning over the thousands of miles from assembly line to auto graveyard, wheel covers of Superior Stainless brightly prove their worth. Snow, mud, gravel, sand, road chemicals can't faze the stay-new look of stainless at this point of severest duty. In addition, precise care in manufacture of Superior Stainless assures the uniform, deep-drawing quality required in today's wheel cover designs. Whether your stainless requirements stress performance, appearance, or both in combination, *you'll do better with Superior.* Let us work with you!

SUPERIOR STEEL DIVISION

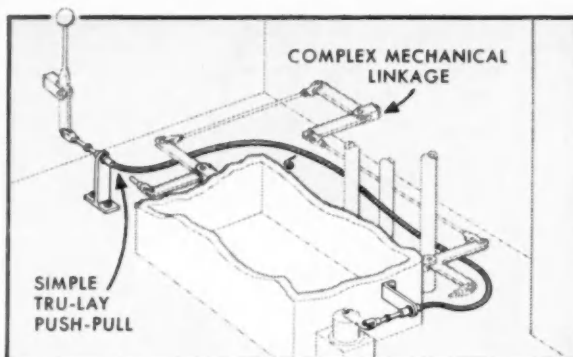
OF
COPPERWELD STEEL COMPANY
CARNEGIE, PENNSYLVANIA

For Export: Copperweld Steel International Company, New York

Wheel covers illustrated manufactured by Lyon, Inc.,
Detroit, Michigan.

TRU-LAY *PUSH-PULL* CONTROLS PROVIDE ACCURATE, DEPENDABLE REMOTE CONTROL FOR HUNDREDS OF PRODUCTS

• If your products involve remote control—electrical, hydraulic, pneumatic or direct—TRU-LAY PUSH-PULL FLEXIBLE CONTROLS can help solve your design problems. They provide positive remote control over long or short distances—up to 150 feet from the control point. Because they operate while flexing, they can snake around obstructions. They will not buckle. They are ruggedly constructed, easily installed and operated, sealed against dirt and moisture, and will handle jobs with as much as 1,000 lbs. input. PUSH-PULL CONTROLS are simple, have but one moving part, are noiseless, and give a lifetime of accuracy. Mechanical linkages, on the other hand, are complex. Unlike PUSH-PULL CONTROLS, they are made of many parts, wear at many points, and produce increased backlash, lost accuracy, and vibration rattles.



Sizes and Operating Heads to Fit Your Design

Control Dimension	Minimum Recommended Radius in Inches	Maximum Input Load in Pounds (Dependent on Travel)
$\frac{3}{32}$ "	2	30
$\frac{1}{8}$ "	3	65-125
$\frac{3}{16}$ "	5	115-175
$\frac{1}{4}$ "	6	300-600
$\frac{5}{16}$ "	8	700-1,000



Heavy Duty • For use where rugged duty prevails, but where operation must be smooth and accurate. Meets all requirements for dependability and life.

Light Duty • Gives smooth, accurate and dependable performance at low cost. Available with your choice of several types of knobs.

Selective Friction • Amount of friction can be changed to meet individual requirements of the operator or application. Friction constant at any setting.

Position Lock • A slight turn of the T-type handle locks the control in any position. Available in two sizes for light and heavy-duty applications.

Micro Control • Push or pull the knob for instantaneous response, then rotate knob for vernier adjustment. Built for smooth, efficient operation on any job.



PUSH-PULL DATA FILE shows how to simplify, improve design

PUSH-PULL CONTROLS are solid as a rod and flexible as a wire rope. They're factory-lubricated for life, unaffected by temperature extremes, and can be adapted to practically any application. For complete details on how you can use them, write for the PUSH-PULL DATA FILE. It contains 7 engineering Bulletins which describe in detail the operation of PUSH-PULL CONTROLS, their applications, features and advantages. Our engineers will be glad to help you make TRU-LAY PUSH-PULL CONTROLS a part of your product.

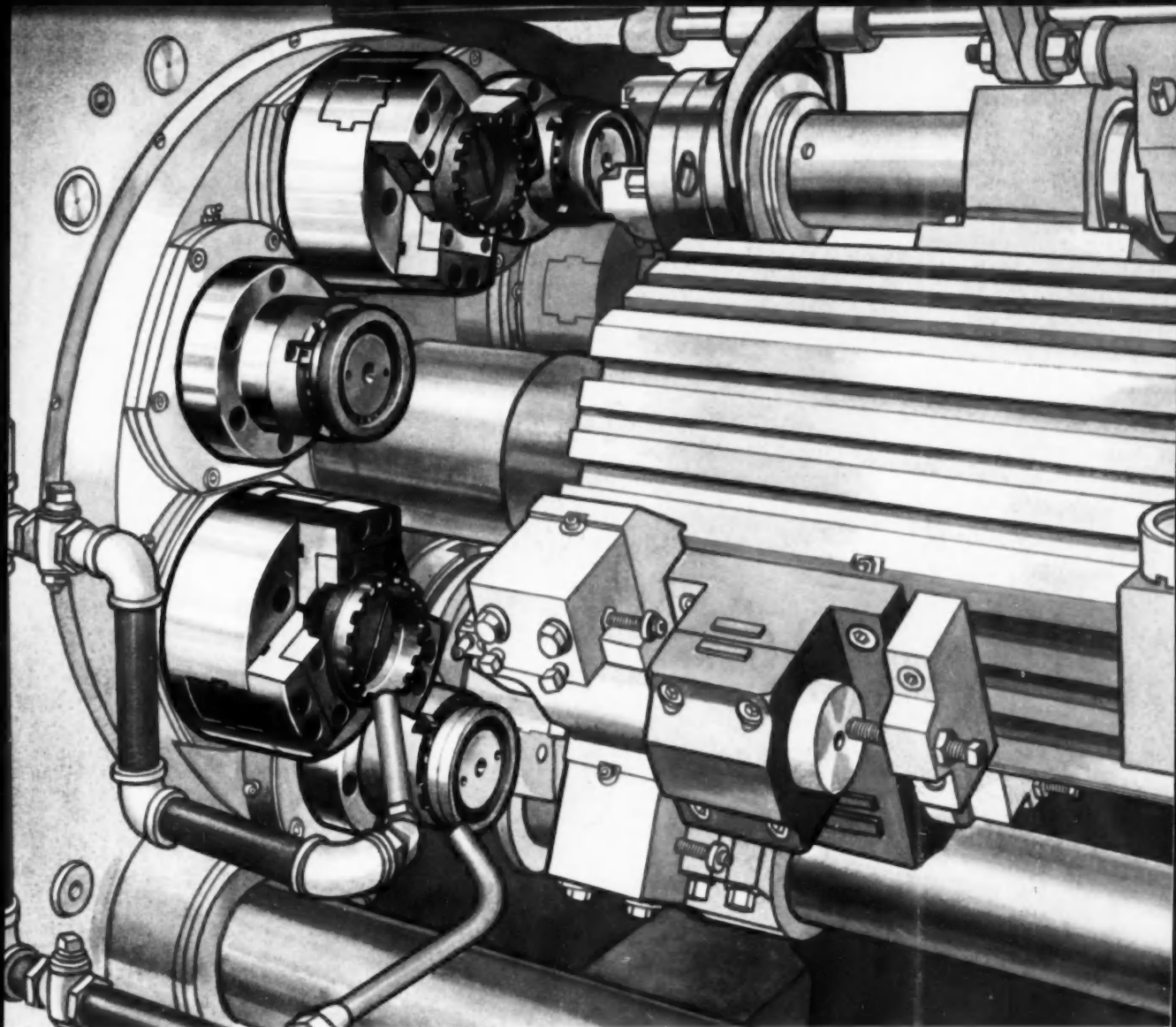
PUSH-PULL CONTROLS

Automotive and Aircraft Division • American Chain & Cable Company, Inc.

601-H Stephenson Bldg., Detroit 2

6800-H East Acco Street, Los Angeles 22 • 929-H Connecticut Ave., Bridgeport 2, Conn.





open secret of *New Britain* superiority.

Wide-open design makes the most fundamental difference between a New Britain automatic chucking machine and other machines. It speaks for itself as a means of getting at the tooling, making adjustments and clearing chips.

Massiveness, right from the floor up, is equally apparent and equally important in chucker work. You see it in the way the cutting tools make the heaviest cuts with a chatter-free smoothness that can't be duplicated.

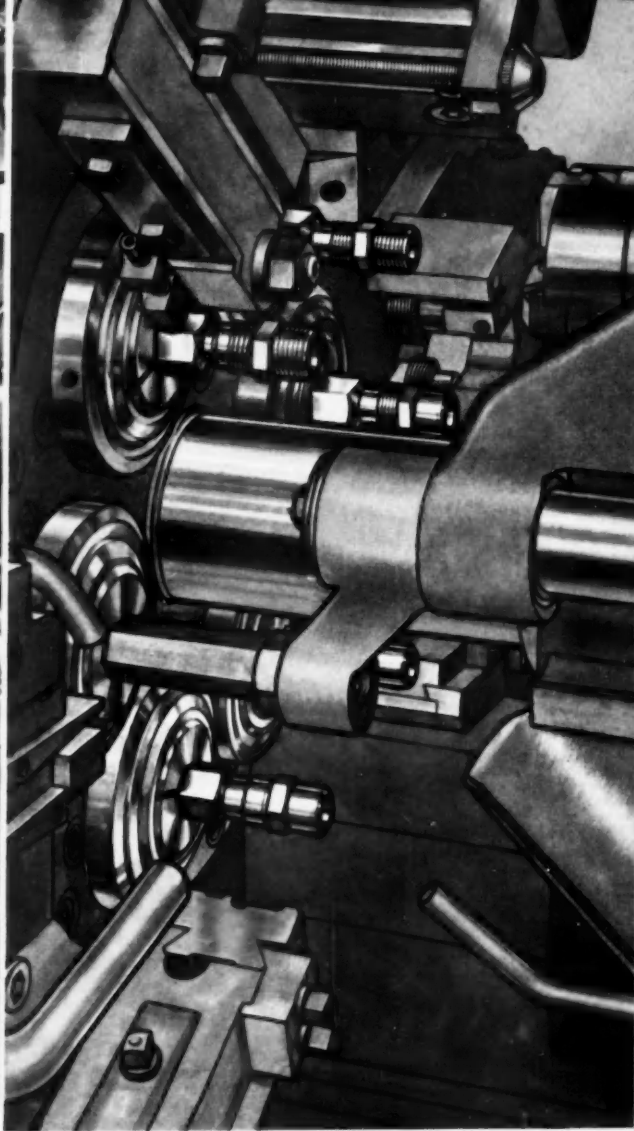
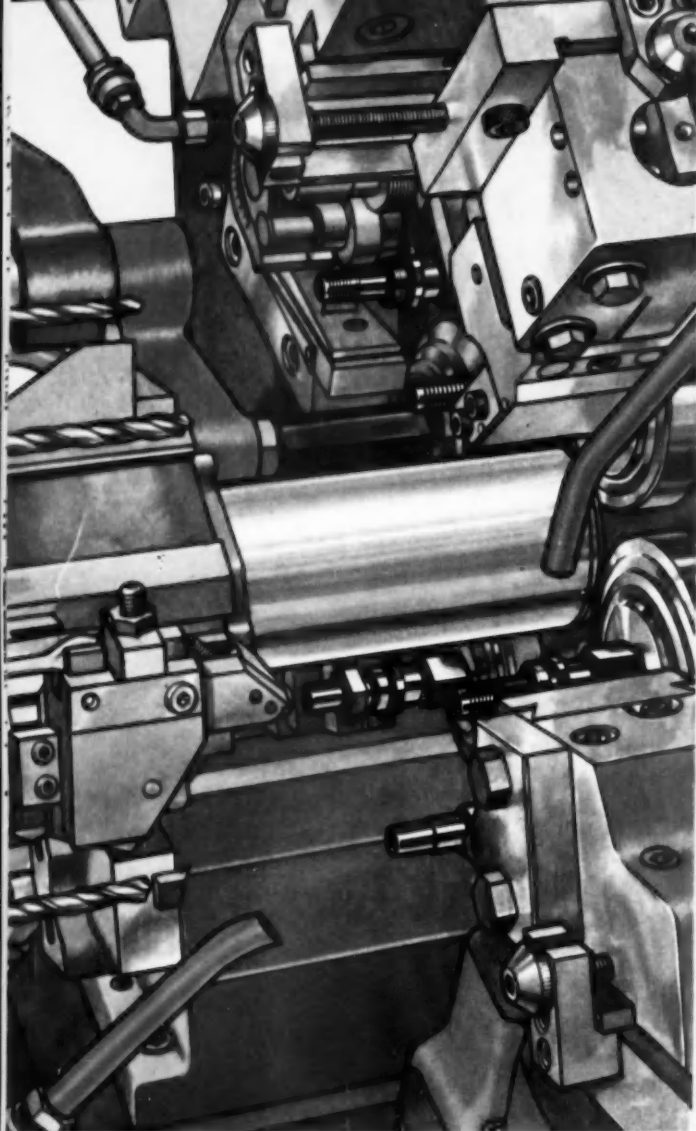
Only New Britain provides a com-

bination of longitudinal with transverse forming motion where needed. This versatility eliminates the need for second operation machines in many cases—particularly when a job is setup for double indexing, as illustrated above.

New Britain spares no pains to incorporate every new development to make chucker-type machining more profitable. The open-end design lends itself particularly well to magazine loading and unloading, for example, and many New Britains are being

equipped to provide this feature.

Whenever a number of operations are required on cast or forged pieces, these massive, rugged, powerful machines offer great possibilities for savings through faster, more accurate, more reliable production. A new and complete catalog on the New Britain chucker line is just off the press. We would be very glad to send you your copy. New Britain-Gridley Machine Division, The New Britain Machine Company, New Britain, Connecticut.



stainless, 225 per hour—brass 1500 per hour.

Up to a point increased machine productivity is a matter of refinements, additions, skillful tooling and perhaps more power. Eventually you achieve about all the efficiency that can be built into equipment of conventional design.

To achieve a major break-through in bar machine productivity necessitated redesign from the ground up. New Britain has done it with such success that we are able to offer the metalworking industry a whole new family of machines with performance unequalled anywhere. Independently cammed cross slides open up a whole new world of tooling possibilities. Power and spindle speeds are adapted to the

important new metals and alloys. Increased chucking capacity allows application of New Britain standards of speed and accuracy to much larger pieces. None of the famous New Britain exclusive features which preserve accuracy and increase accessibility over other machines have been

sacrificed. The chart below tells part of the story, and we have complete literature available to spell it out completely on the models which interest you particularly. New Britain-Gridley Machine Division, The New Britain Machine Company, New Britain, Connecticut.

Model	Spindles	Cross Slides	Spindle Speeds	Spindle Capacity	H.P.	Weight
45	4	4	43-526	5"	30-50	46,000
52	6	6	271-4250	1 1/4"	15-25	12,800
62	6	6	177-3000	1 5/8"	15-30	18,800
62	6	6	177-3000	2 1/4"	20-30	18,875
82	6	6	64-633	3 1/2"	30-50	46,000
83	8	6	99-1504	2 5/8"	30-50	46,000

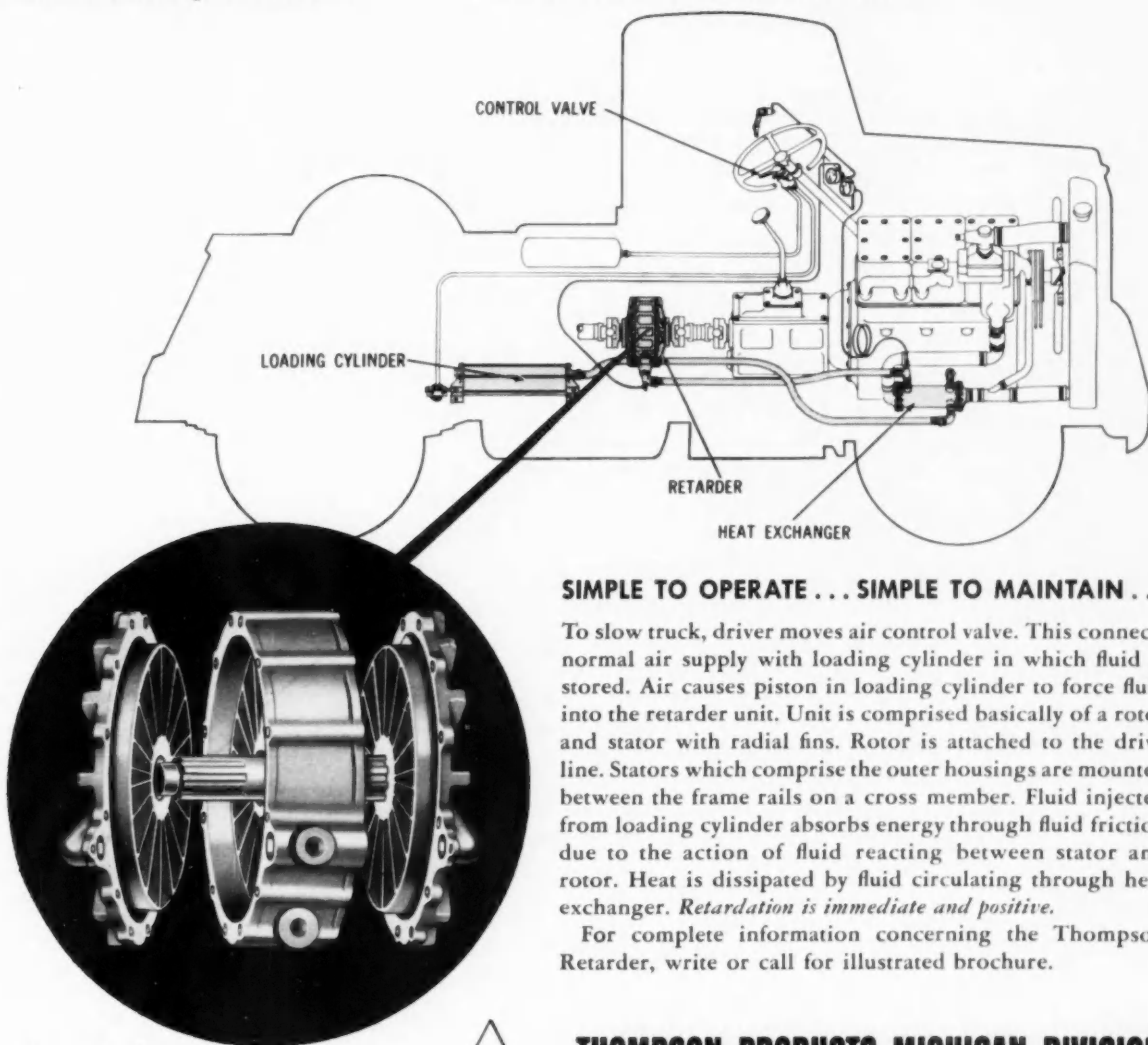
It's Dynamic...

LEADING TRUCK MAKERS ADOPT THOMPSON RETARDER

**New dynamic system
cuts speed without use of
brakes, means new safety
and economy for users**

Several leading truck manufacturers are offering the new lightweight, low cost Truck Retarder, developed and manufactured by Thompson's Michigan Division. This new, auxiliary system gives drivers better control of their vehicles, helps prevent "runaways". Service brakes remain cool and ready for emergency stops.

Users report major savings through substantially reduced brake maintenance costs, increased tire life, faster trips and less engine maintenance. Safety is increased, costs are reduced.



SIMPLE TO OPERATE... SIMPLE TO MAINTAIN...

To slow truck, driver moves air control valve. This connects normal air supply with loading cylinder in which fluid is stored. Air causes piston in loading cylinder to force fluid into the retarder unit. Unit is comprised basically of a rotor and stator with radial fins. Rotor is attached to the drive line. Stators which comprise the outer housings are mounted between the frame rails on a cross member. Fluid injected from loading cylinder absorbs energy through fluid friction due to the action of fluid reacting between stator and rotor. Heat is dissipated by fluid circulating through heat exchanger. *Retardation is immediate and positive.*

For complete information concerning the Thompson Retarder, write or call for illustrated brochure.

Also available in rear
axle mount.

AUTOMOTIVE GROUP



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DIVISION

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MANUFACTURING DIVISION

Buy 10%-15% longer bearing life with

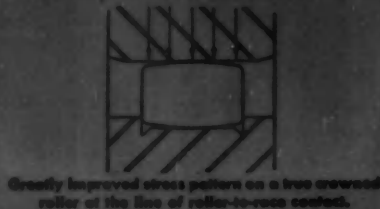
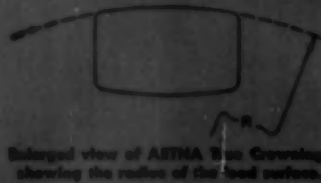
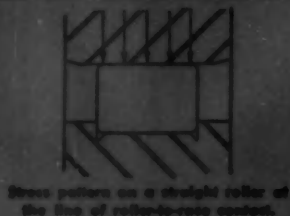
Aetna

TRUE CROWNED Roller Bearings

Competitive tests of AETNA *True Crowned* Roller Bearings with standard roller bearings by leading machinery builders on identical equipment, with identical load stresses, proved conclusively, time and time again, that AETNA *True Crowned* Roller Bearings have a 10% to 15% longer service life.

There is no premium for this *True Crowned* bearing surface. AETNA engineers recommend *True Crowned* rollers because this design provides the best distribution of stresses across the full length of the roller. You simply buy longer service life at the same cost by specifying AETNA.

The reason for longer bearing life is apparent in these drawings:



Each roller incorporated into AETNA Roller Bearings is carefully ground to a fine finish with a large radius to relieve the high stress point present where two cylindrical bodies are in rolling contact and under load. The crown radius is scientifically determined and varies with the size of the roller.

AETNA stocks pure radial cylindrical roller bearings, and is equipped to supply pure thrust or special types with standard, precision or super-precision tolerances in special alloys to give longer life to your products. Call your local AETNA representative listed in the yellow pages of your Classified Phone Book, or write today for General Catalog and Engineering Manual—new 15th Edition.

Aetna

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DIVISION OF PARKERSBURGH-AETNA CORPORATION • 4600 SCHUBERT AVE. • CHICAGO 39, ILL.
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AC Presents the Art Carney Show, NBC-TV, December 4

SPARK PLUG THE ELECTRONICS DIVISION OF GENERAL MOTORS

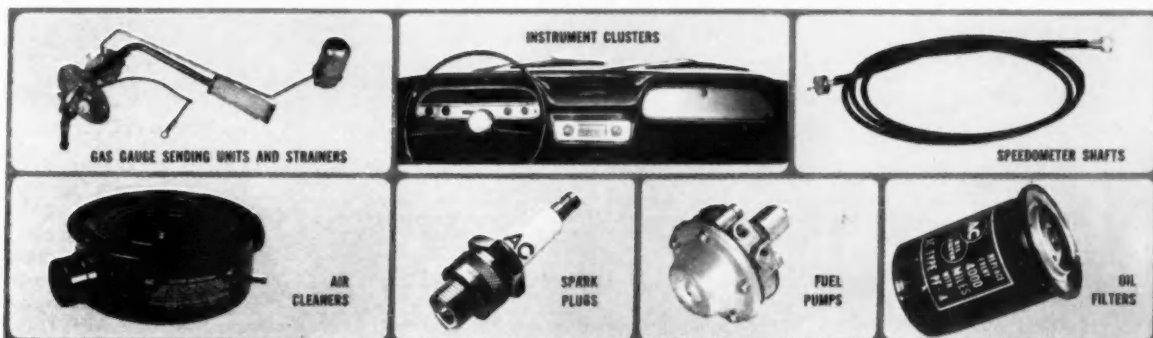
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Hwy., Cedar 4-5611

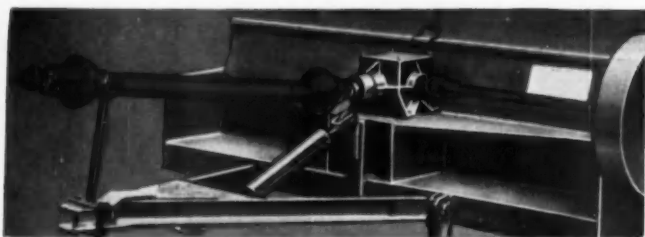
CHICAGO—7074 N. Western
Ave., Rogers Park 4-9700

DETROIT—General Motors
Bldg., Trinity 5-9197

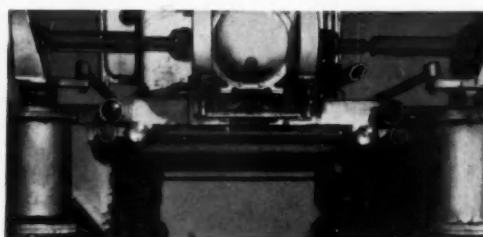
PHILADELPHIA—7 Bala Avenue,
Mohawk 4-9722, BALA-CYNWYD

LOS ANGELES—7666 Telegraph
Road, Raymond 3-5171

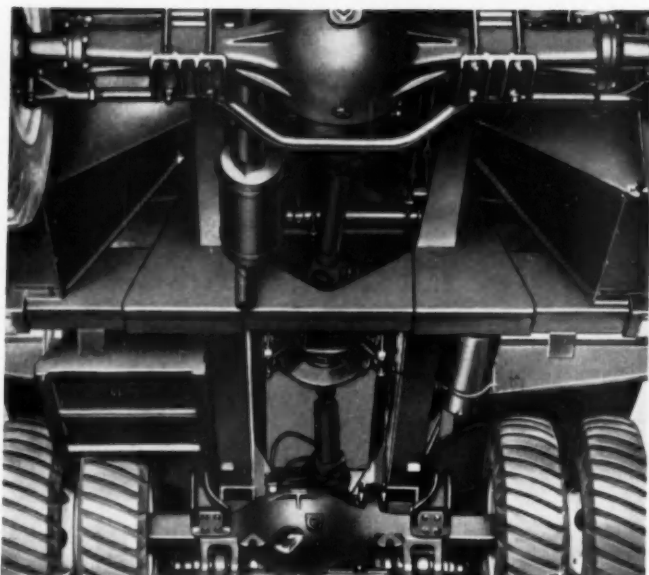




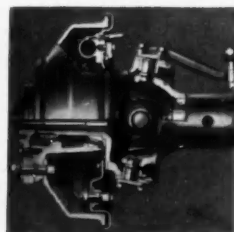
Shielded Farm Implement Drive, Tractor P.T.O. to Gear Box



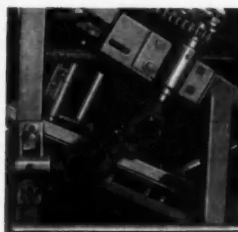
Differential to Drive Sprocket, Straddle Truck



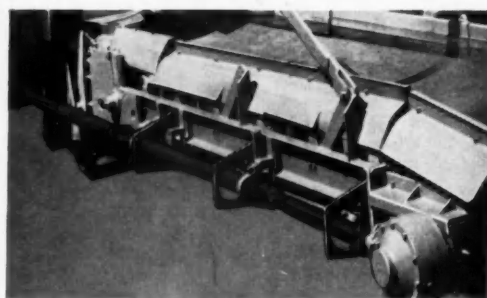
Mobile Crane, All-Wheel Drive Propeller Shafts



Jointed Front-Driving Axle



High Angle, Double Joints



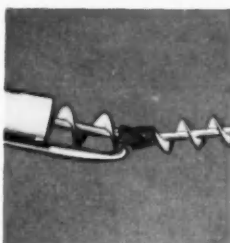
Road Grader, Detachable Belt Conveyor Drive

POWER TRANSMISSION PROBLEMS SOLVED with Blood Brothers U-Joints

Rockwell-Standard engineers see—and help *solve*—a tremendous variety of problems involving a need for universal joints. Applications range from manual steering assemblies...to power take-off drives...to heavy duty propeller shafts.

To "get the power through," Blood Brothers Joints are built in the widest range of types and sizes. This range, plus application experience, can be valuable to you. Whether you want to "take power around corners"...or allow for possible minor misalignments—you can call on Rockwell-Standard engineers.

They'll cooperate to save your staff's time—on common or unusual power transmission problems.



Jointed Screw Conveyor



Tractor Steering Assembly



Transmission P.T.O. Drives Pump and Gear Box



ROCKWELL-STANDARD CORPORATION

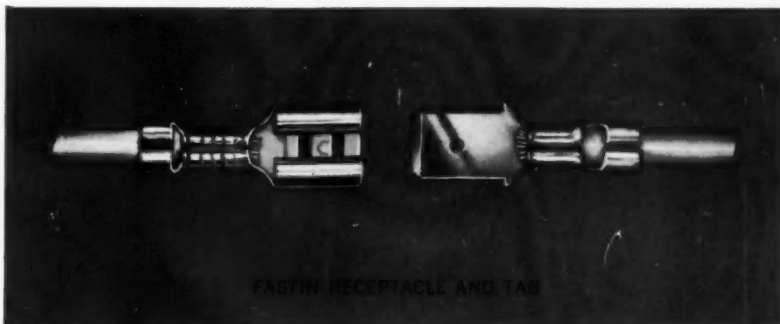
Blood Brothers Universal Joints

ALLEGAN, MICHIGAN



For general information, request our Bulletin 557

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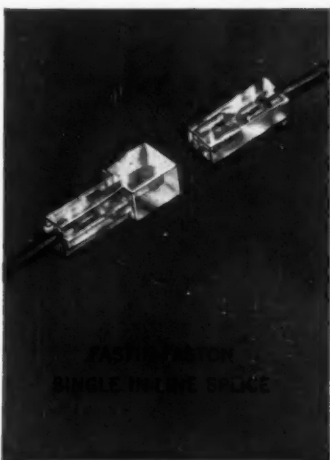


FASTON RECEPTACLE AND TAB

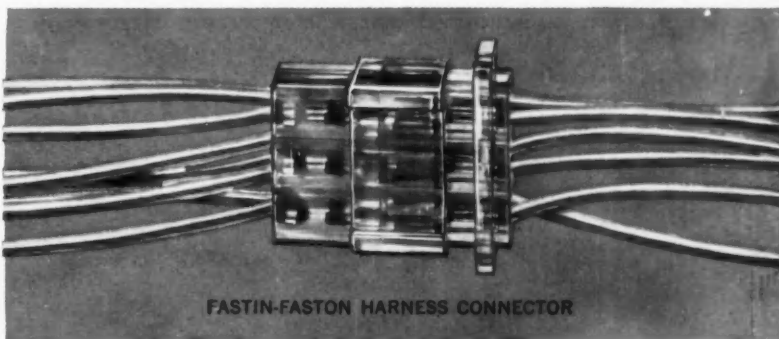


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ECONOMY TAILORED TO YOUR CIRCUITRY REQUIREMENTS



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FASTON-FASTON HARNESS CONNECTOR

THE **A-MP** FASTON® LINE

It terminates the best circuits in the appliance and automotive fields.

It's an A-MP Automachine product featuring remarkable production rates. It offers the highest reliability and . . . the total installed cost is lower than anything you're now using.

That's the A-MP Faston® line.

Equally important, the A-MP Faston receptacle has outstanding vibration resistance, a broad temperature tolerance range and uniform performance in quantities of one or a million.

Made in single circuit units (flag or straight receptacles) and

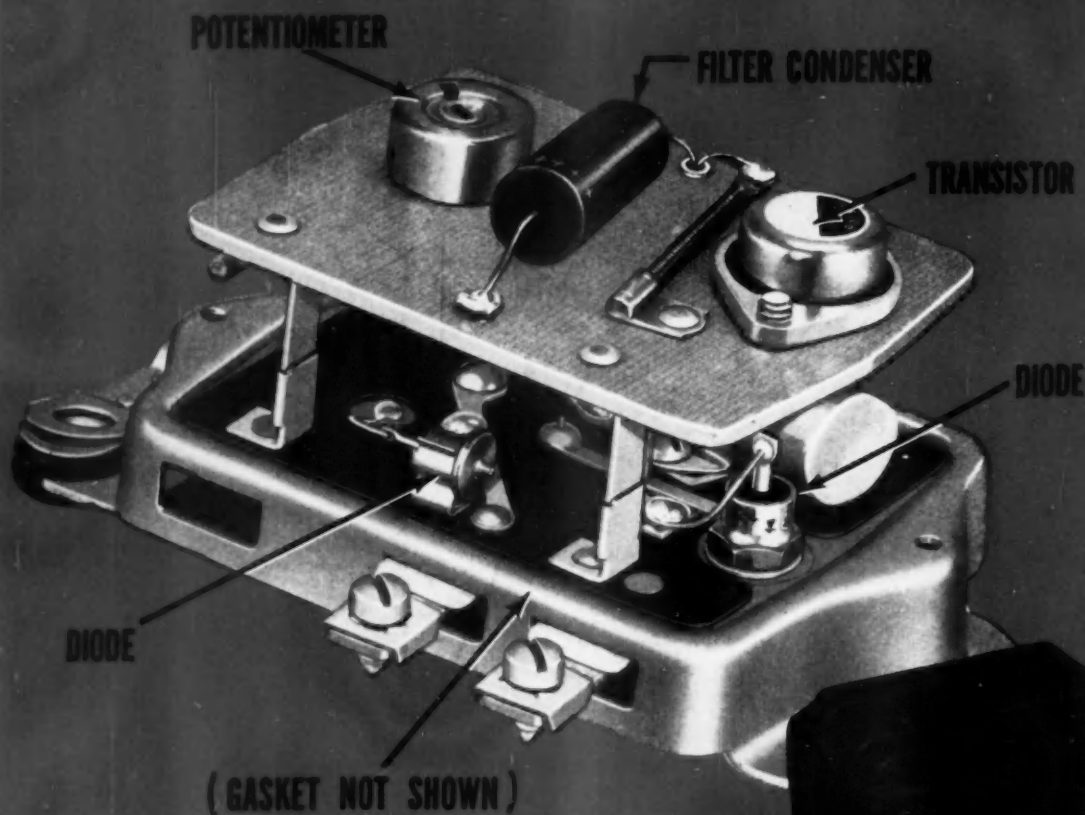
Faston-Faston connector units (one or six circuits), this A-MP line offers unbeatable versatility to fit practically any circuit connection requirement in tab width .250, .205, .187, and .110.

If you are not specifying "A-MP" to save on your circuitry design and production costs, send today for the new A-MP Faston Catalog.

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GENERAL OFFICES: HARRISBURG, PENNSYLVANIA

A-MP products and engineering assistance are available through subsidiary companies in: Canada • England • France • Holland • Japan



PROGRESSIVE ENGINEERING MAKES THE DIFFERENCE

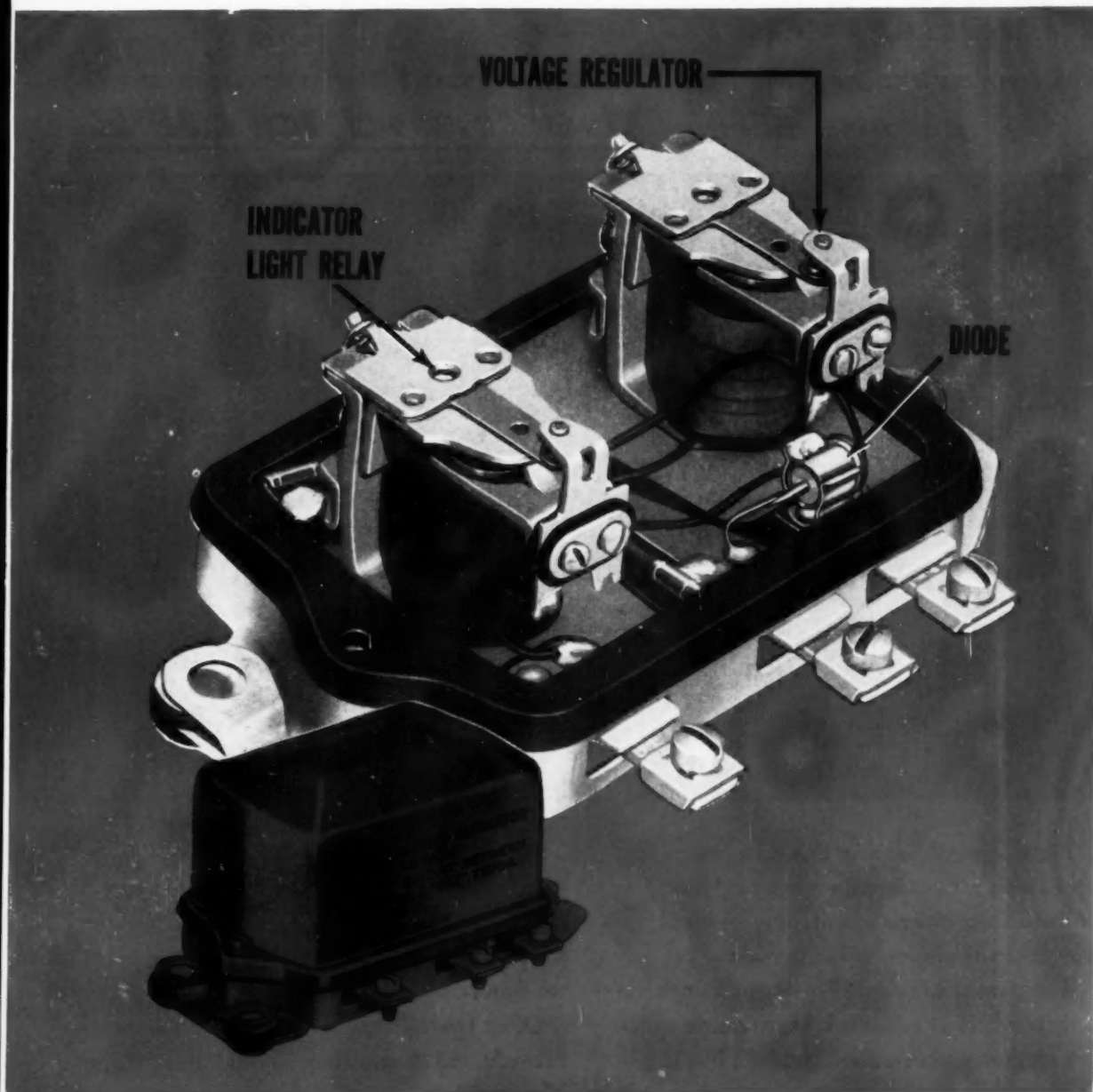
ONLY DELCO-REMY OFFERS FULL-TRANSISTOR

*Designed for use with
DELCO-REMY'S new self-
rectifying a.c. generators*

Now you can choose between *two* modern new Delco-Remy regulators—the most accurate available today. One is a full-transistor model, the other transistorized.

The FULL-TRANSISTOR REGULATOR has no moving parts and offers the ultimate in accurate electrical performance, durability and reliability. It is composed entirely of transistors, diodes, condensers and resistors, permitting higher field current for better generator performance. Constant voltage control is unaffected by temperature changes, vibration, or mounting position. A simplified external adjusting feature permits easy voltage setting for varying operating conditions. And this full-transistor regulator requires no periodic servicing.

The TRANSISTORIZED REGULATOR contains a single transistor and diode working in conjunction with a vibrating-type voltage sensing unit. The transistorized circuit



AND TRANSISTORIZED VOLTAGE REGULATORS

permits high field current for improved generator performance with low non-inductive current through the contacts for greatly extended contact life. Models are available for circuits containing either ammeters or indicator lights. All units are temperature compensated to better match battery voltage requirements.

Both the full-transistor and the transistorized models have the same mounting dimensions as standard regulators.

Whichever model you choose for your new vehicles or for replacement on present ones, you can be sure of reduced servicing and extended battery life. Available from your car or truck dealer or through the United Motors System.

FROM THE HIGHWAY TO THE STARS

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ELECTRICAL SYSTEMS



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Fleet Owners tell us

*It's the average mileage per clutch and the average cost per mile that turn **the trend to LIPE***



Fleet operators are business men first and always. Costs mean more to them than enthusiastic claims about new methods of power transmission or conversion.

They want to know! How much does the unit cost? Is it reliable? How many miles does it run between tear-downs? How many men does it take to tear it down? And what is the repair cost, not only in terms of labor and replacement parts, but in loss of capital-equipment use?

In fleet after fleet, when all the figures are in, the conclusion is inescapable. Lipe clutches give longer equipment use...more miles between tear-downs...more total mileage...all at lower average cost per mile.

Offer these fleet owners what their cost-records tell them they should buy: Lipe Heavy-Duty DPB Clutches, either as original or optional equipment. Let their growing numbers prove to you that... *the trend is to LIPE!*



Lipe Heavy-Duty DPB Clutches are available in single and two-plate types; 12", 13", 14" and 15" sizes; with torque capacities from 300 to 1900 ft.-lbs.





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CARBURETOR
MILES-PER-GALLON**

HELP TURN CUSTOMERS INTO REPEAT BUYERS



"It's a fact, repeat sales depend many times on carburetor performance. Good performance keeps the customer coming back year after year. He demands good gas mileage, easy starting, and no stalling."



"Right . . . and STROMBERG* carburetor economy, reliability, and efficiency build owner loyalty. It's a product of Bendix, and they're still the leader in automotive and aircraft fuel systems after forty years." *REG. U.S. PAT. OFF.

Bendix-Elmira
ECLIPSE MACHINE DIVISION
ELMIRA, NEW YORK

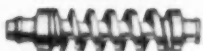


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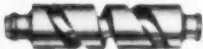


*Ross variable ratio steering has
been proved in service by 31
of today's vehicle manufacturers
... including 9 of 13 makers of
heavy-duty trucks*

Constant Ratio



Variable* Ratio



*Originated and developed by Ross

● Ross variable-ratio steering gives faster steering and quicker recovery for turns . . . and slower steering and greater stability for straight-ahead handling. Ross invites your inquiry.

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ROSS GEAR AND TOOL COMPANY, INC. • LAFAYETTE, INDIANA
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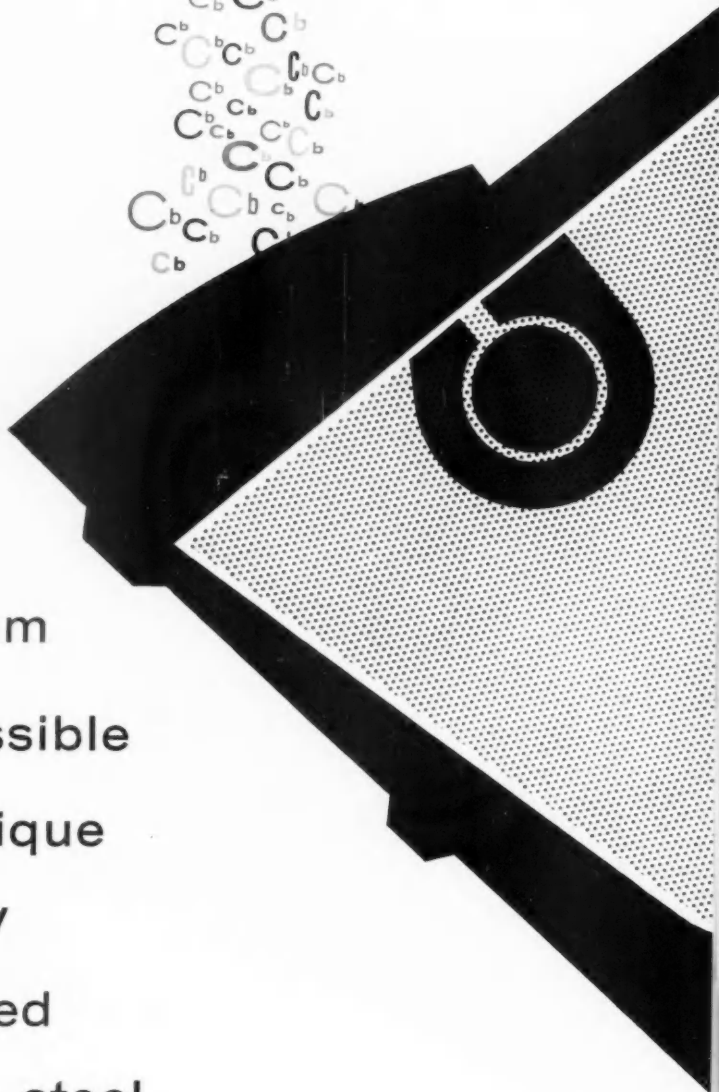
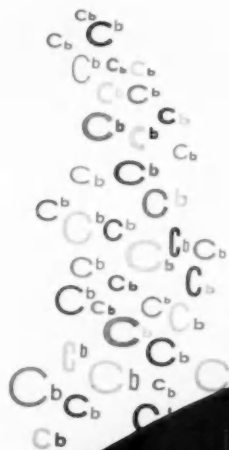


for better rings

Quality is no accident. It comes only through rigid production standards and continuous quality control, through "light-tight" tests and other checks that have set the finest standards you'll find anywhere in the industry! Let us put these standards of quality to work for you.

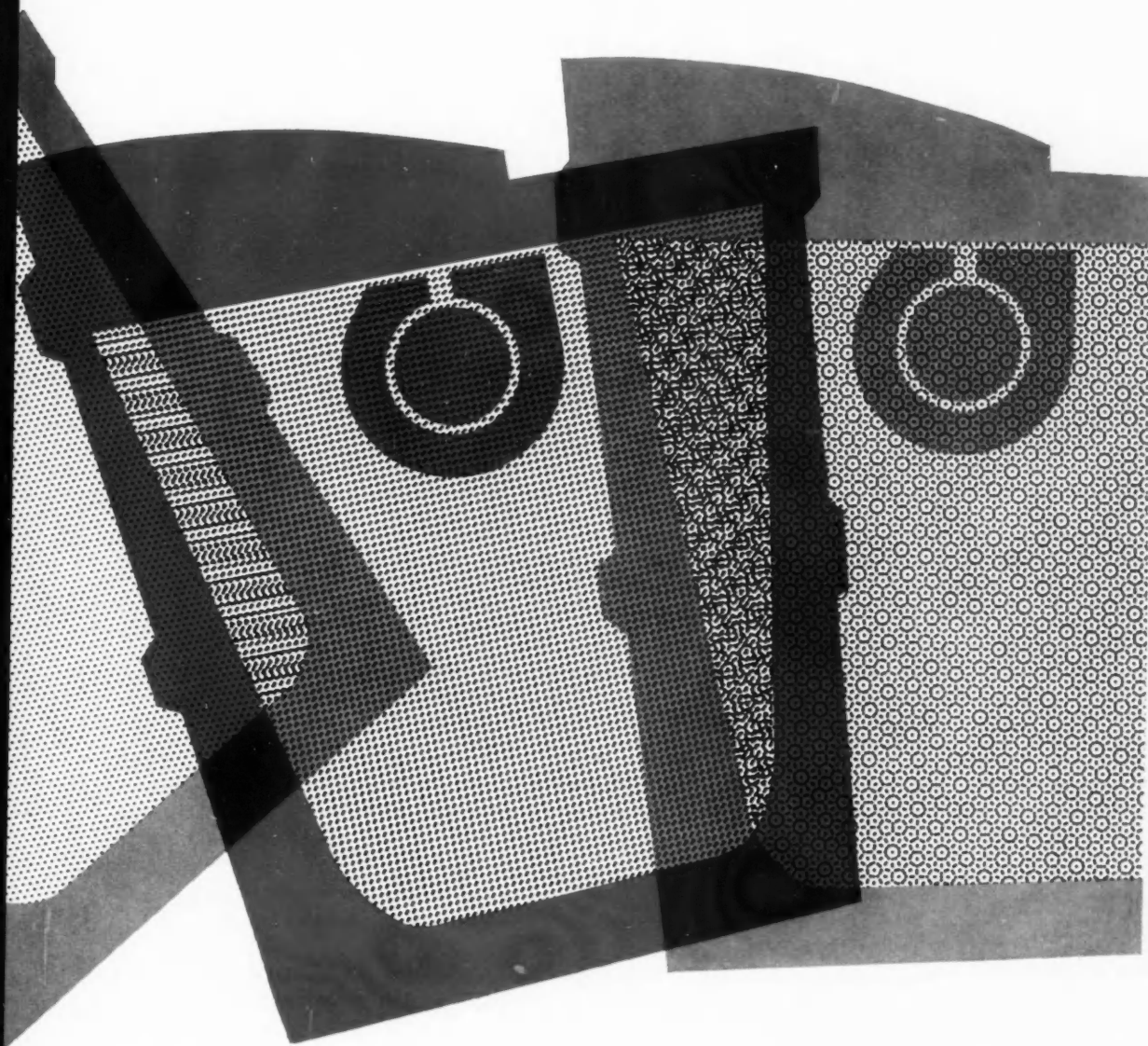
McQUAY-NORRIS MANUFACTURING CO. • ST. LOUIS • TORONTO

Largest producer of small rings in the automotive industry.



Columbium
makes possible
this unique
new
fine-grained
carbon steel

GLX-W



Compare fine-grained GLX-W with the steel you use

Great Lakes adds a precise amount of columbium to good-quality carbon steel. The result is fine-grained GLX-W steel. Here's how GLX-W compares with mild carbon steels . . .

- GLX-W is 50-100% stronger
- Has greater notch toughness
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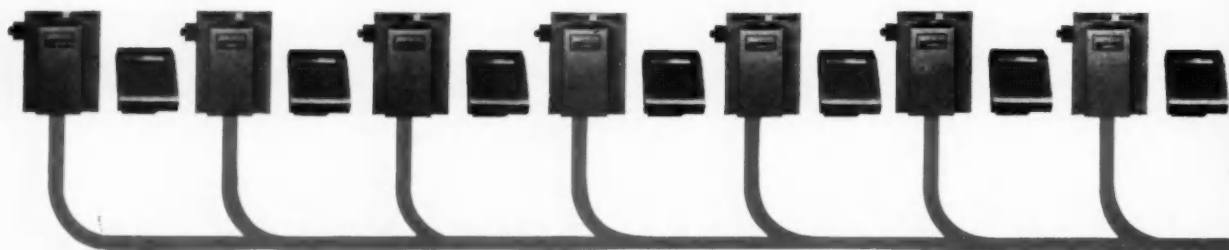
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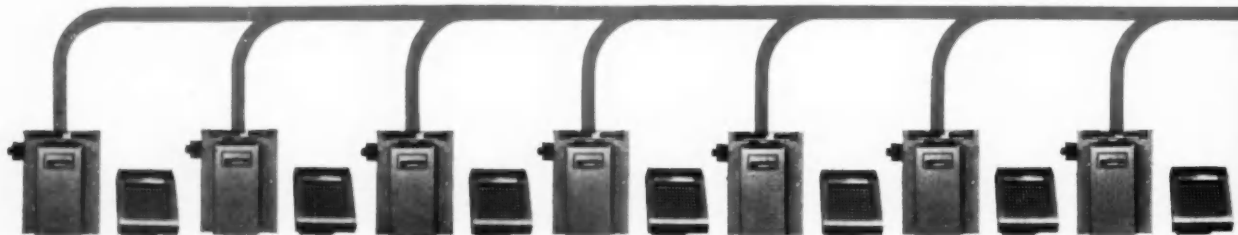
MANAGEMENT—Improved operating control based on timely, valid production facts

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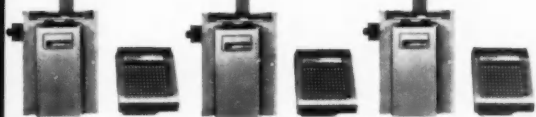
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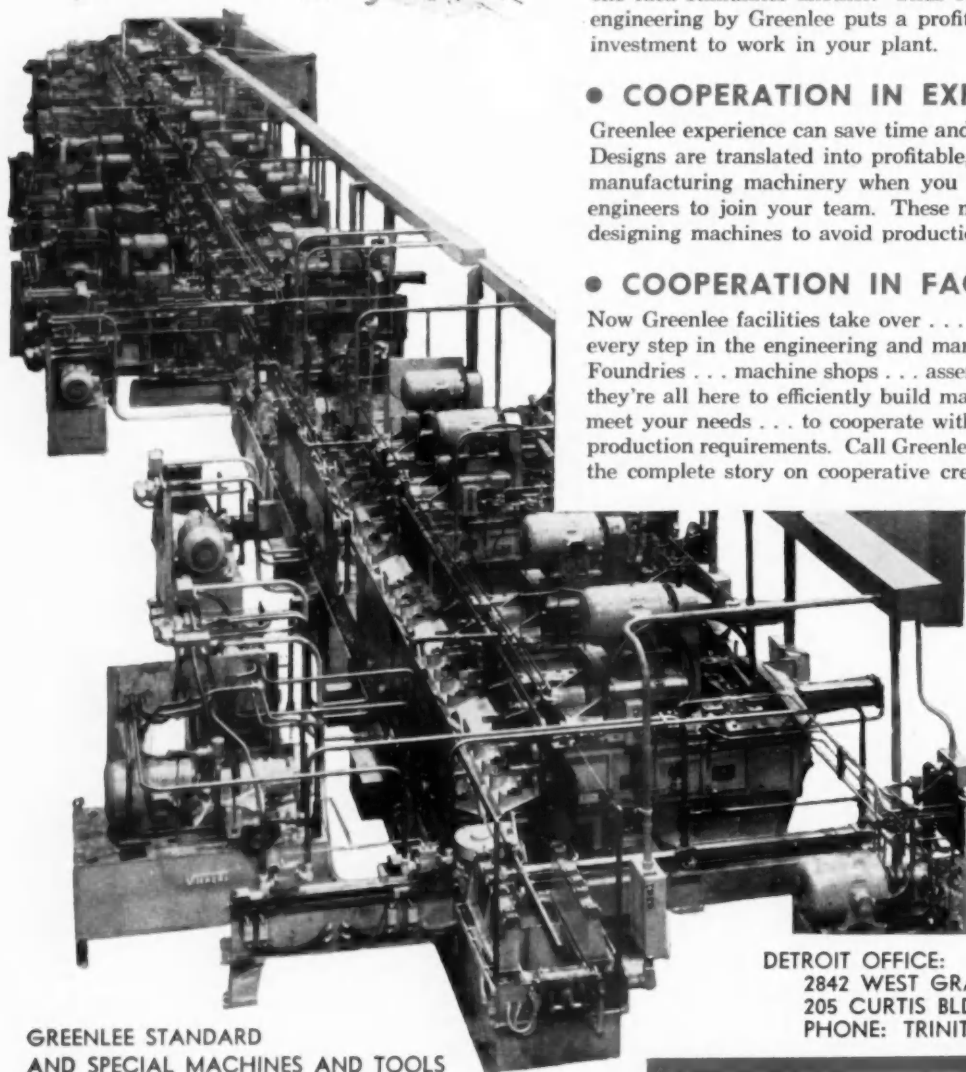
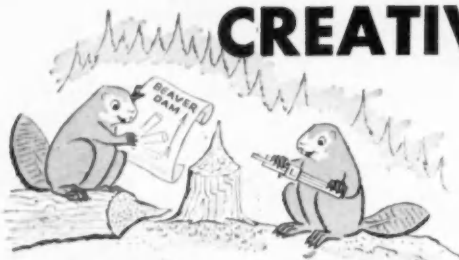


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NEWS

Vol. 121, No. 10

November 15, 1959

Independents Boost Output of Station Wagons, Convertibles

American Motors and Studebaker-Packard are turning more of their productive efforts to special body styles, and with encouraging results.

AMC's Rambler leans heavily on its station wagons for sales support and there are signs the wagon will occupy a stronger position in 1960 tabulations than in '59.

Studebaker's Lark station wagon, was available in only a two-door model during 1959, but it sold better than the industry average. A four-door wagon, new for 1960, should bring S-P's wagon total up by a healthy margin, judging by the 5-1 industry ratio of four-door wagons over two-doors.

Studebaker also is getting the jump on the compact field with a convertible in its 1960 lineup, and Rambler is expected to have one before another year is up. So far none of the Big Three compacts has announced plans for a convertible, although Ford is toying with the idea.

Station Wagon Sales

Here's an indication of the importance of special body styles to the independents. American Motors, during the 1959 model year, sold slightly less than 40 per cent of its total cars in station wagons, for a total of 148,430. During the

initial run of 1960 models, through November 7, the figure was 45 per cent.

AMC sold 32,599 two-door American station wagons, or 35.7 per cent of all Rambler American sales. In the more popular Rambler group (which accounted for 64.8 per cent of all AMC sales), the station wagons took 43.7 per cent, or a total of 105,975. The percentage went even higher, to 49.2, in the Revel V-8 series.

But for the industry, two-door

wagons accounted for slightly more than three per cent and four-door wagons for only 16.2 per cent.

Output Above Average

Lark is starting out strong with its convertible, which incidentally is priced below any other U. S. convertible. Initial production schedules called for approximately 10 per cent in soft tops—well above the industry average of 5.3 per cent for 1959 and well above the Ford, Chevrolet and Plymouth ratios.

Of the Big Three compacts, only Valiant is marketing a station wagon.

Both S-P and AMC continue to

HILLMAN MINX HAS LOWER, LONGER LOOK



Hillman Minx deluxe sedan for 1960 has been restyled to give a longer lower look. Engineering features include larger braking area, and a new manifold and carburetor. Maximum power of the four-cylinder ohv engine has been boosted to 56 hp. Overall length of the Hillman line is 162 in.; width is 60.75 in. and wheelbase, 96 in. Prices start at \$1735, port-of-entry.

NEW FRENCH IMPORT BOWS



Panhard's new line of PL-17 models features a four-door sedan, a four-door station wagon, and a sports convertible. All models are powered by a two-cylinder, all-aluminum air-cooled engine with front wheel drive. Car is built on a 101-in. wheelbase and measures 180 in. overall. Prices start at \$1697, port of entry.

offer higher priced models. Studebaker has the Hawk and the imported Mercedes-Benz line, and American Motors the 117-in. wheelbase Ambassador. But both companies count on the compacts for their bread and butter, and they will lean more and more on the station wagons and convertibles during the tighter competition coming in the next few years.

Renault to Boost Car Production

Renault plans to boost its 1960 production by 30 per cent over this year, says Pierre Vignal, general export manager of the French car maker.

Vignal reported that Renault is now producing some 2300 cars daily and expects to step this up to 3000 next year.

Anglia Priced at \$1583

Prices on 1960 English Ford passenger cars and vans sold in this country remain unchanged, except for a \$22 increase in the Anglia. But the restyled Anglia, which features a new engine and four-speed transmission, still is the lowest of the English Ford line.

Suggested eastcoast port of en-

try retail prices, range from \$1583 for the Anglia to \$2865 for the Zodiac convertible. Thames vans are priced at \$1386 and \$2070, and the Thames Estate car is priced at \$2447.

Gas Turbine Tested

A former Chrysler engineer has developed and tested a lightweight, medium horsepower gas turbine engine said to offer fuel economy almost as good as most marine and automotive piston engines.

The engine was built by the Williams Research Corp. of Walled Lake, Mich. Sam Williams, president of the company, worked on turbine projects in the Chrysler Engineering Div. He left Chrysler five years ago and set up his own firm.

Williams says a 75-hp version of his engine has been tested on a boat on the Detroit River during the past 15 months. Test stands have been used for aircraft versions of the engine. The turbine, in normal operation, runs at 58,500 rpm, but Williams says it has operated as high as 61,000 rpm. Power output shaft turns at around 500 rpm.

The engine uses a high percentage of aluminum alloys. Williams says its weight of one pound per

horsepower is about one-third the horsepower weight of other heat exchanger gas turbines.

The engine was designed for mass production with existing methods, according to Williams, making it competitive with medium-priced piston engines.

Ford Compact Truck

Ford Motor Co. has begun hand-building the first prototypes of a new Econoline compact truck. The truck is being pushed for production by mid-1960.

The Econoline models will be blunt-nose like the Volkswagen microbus and more akin to the Falcon passenger car than to the standard Ford truck line.

Safety-minded Ford, incidentally, is preparing a station wagon with two doors on the right side but only one door on the driver's side. This way, the rear seat passengers will not be able to step out into traffic, and will have to step to the right.

Canadians Ask Car Import Curbs

The Windsor City Council has asked the Oshawa City Council to join it in protesting the large number of U.S.-built compact cars being imported into Canada. The move was sparked by reports that General Motors had already imported 5500 of its new Corvairs, because its new Oshawa plant would not be able to meet the demands of the fall market.

One alderman has asked for a cut in import duties on car parts to be assembled in Canada and a big boost on duties on finished cars brought into the country.

GM of Canada reportedly denies that as many as 5500 Corvairs have been imported and has claimed that many of the Corvair parts are made in Canada and sent to the U. S. for assembly.

Chrysler May Enter Finance Field

Chrysler Corp. has admitted the possibility of entering the new car financing business. Ford Motor Co. announced a similar move earlier this year.

Byron J. Nichols, Chrysler Group Vice-President — Automotive Sales, said his company is intensifying its effort to bring about improved financing for both dealers and customers. New departments have been set up to study financing needs so that Chrysler will be ready to meet whatever requirements are necessary to maintain a strong competitive position.

Nichols, in a speech before the mid-continent trust conference in Detroit, said that such things as the strategy of Chrysler's "major competitors" and the prospective money conditions make it necessary for Chrysler to "explore every possibility."

New Diamond T Trucks

Three new trucks with gross vehicle weights ranging from 21,000 to 30,000 lb have been introduced by Diamond T Motor Truck Co. The new models, designated 534, 634 and 734, are equipped with Diamond T's Super Service DT-6 wet-sleeve gasoline engines. GCW ratings range from 35,000 to 60,000 lb, and six-wheel versions of the new models range as high as 46,000 in GVW.

Oheim Heads F.E.I.

C. L. Oheim, vice-president of Deere & Co., was elected president of the Farm Equipment Institute at its 66th annual convention in Montreal.

Carl L. Hecker, president of Oliver Corp. was named chairman of the Executive Committee. He succeeds Oheim, who held the post for the past year.

VOLVO OFFERS NEW LUXURY SEDAN



A new Volvo sedan, the 122 S, will be sold in this country through Volvo Import, Inc. The four-door luxury sedan is powered by Volvo's four-cylinder, 97-cu in. sports engine, which is fitted with twin carburetors and develops 85 bhp at 5500 rpm. Compression ratio is 8.2 to 1; maximum torque, 87 lb/ft at 3500 rpm. Wheelbase is 102 in.; overall length, 175 in.; and weight 2400 lb.

Car Output Curbed as Sales Keep Pace

With the nation's steel mills back in operation again, car makers are faced with the problem of juggling schedules until steel is in "normal" supply.

Each car company seems to have a different problem. General Motors, for instance, is completely shut down, and must wait until its fabricating plants have rebuilt the depleted parts banks before it can call back assembly workers. One GM spokesman said it would be around Christmas time before passenger car assembly could be resumed; another estimate placed the date earlier in December, but not before the end of November.

Ford began working short weeks the first of November to spread out production. Some assembly plants, however, were back to five days by mid-November as the company began to ease back to normal schedules. But Ford, like the others, must count on a fast comeback in the steel industry to schedule full production into next month, and still maintain full component banks.

The independents, American Motors and Studebaker-Packard, apparently came out well, although December shutdowns are expected.

Car Sales Up

Meanwhile, new car sales continued their fast pace into November. Sales no doubt were spurred on, at least in part, by the threat of a shortage as production stopped. But October reports indicate a good year ahead.

One automobile company vice-president said the new car shortage in the final days of 1959 might boost 1960 sales close to seven

Less Down Time

At Chrysler, the problem is not quite so crucial, since Chrysler might be able to get some of its stamping operations going before car assembly lines shut down towards the end of November. This would mean the actual down time would be much shorter than for GM.

NEWS

CONTINUED

million, well above the predictions of 6.5 million.

So it appears that all the car plants will be working full speed, with plenty of overtime, into the second quarter of 1960.

All the car makers seem to be sharing in the Autumn sales rush. Rambler reports first-month sales set a record with 32,486 units, a gain of 21.5 per cent over the comparable month a year ago. Lark sales in its first 10-day period and first full month were double a year ago.

Dodge Has Record Rise

Dodge reported a 57 per cent increase for the first 20 days, with 16,130 units sold. Imperial sales for the first 30 days of the model year were up 133 per cent, from 1100 to 2539.

Cadillac posted its best October and third best month of all time with 14,407 deliveries. Mercury sales of 16,691 made October the highest month in two years and were 99 per cent ahead of last year.

Chevrolet sales of 133,510 set a record for October. Pontiac delivered 44,335 new cars to make October that division's best month since September, 1955. Oldsmobile had its best month since May 1955 and Buick reported its best October since record 1955.

GM Forms New Div.

General Motors is out to get more of the lucrative defense business that other companies have been copping in recent years. A new division, Defense Systems, has been set up at GM to develop weapons systems and related defense projects.

Defense business has been a diminishing part of GM's total operation, amounting to \$287 million during the first nine months of 1959. During the same period a year ago, military sales totaled \$356 million.

GM named Harold R. Boyer the new vice president to head the Defense Systems Div. Boyer, with close ties to the military, has been

director of military products for GM since last April. His experience includes a stint as general manager of Cadillac's Cleveland tank plant, a term during early World War II as chief of the Aircraft Manufacturing Branch of the War Production Board, and as chief of aircraft production for the Defense Production Administration in 1951 and '52.

GM president John F. Gordon says the new Defense Systems Div., located at the Tech Center, will be composed mainly of scientific and engineering personnel and will engage in "research and experimentation aimed toward design and development of weapons systems."

GM is not expecting to manufacture any defense products through its new division, although the group will be responsible for coordination of the productive efforts of other GM divisions.

In other words, GM would be happy to produce any of the products developed by the new division.

Ford Parts Depot

Ford Tractor & Implement Div. will build a new national parts depot in Troy, Mich., north of Detroit. The new building is planned to accommodate increased business and a wider product line.




Electric Car to Be Launched in 1960

Nu-Way Industries, Inc. announced plans to launch an electric runabout early next year. The vehicle, intended primarily for city driving, will have a moderate top speed and a cruising radius of 75 to 80 miles.

Nu-Way officials said the runabout will have an all-fiberglass body with a choice of removable tops. It will be mounted on a conventional steel chassis frame to start with, but an aluminum frame is planned. Overall length is 148-in., width 62-in., and weight 2100 lb.


The car is powered by six, 12-volt batteries with a built-in charger that operates on either 110 or 220 volt power supply. The batteries are housed in the rear compartment together with two motors, which are connected to the rear axle, one on each side.

Nu-Way also said it is working on a new electronic control that will permit the car to accelerate from zero to 45 mph without pause or halting. It also is working with a major electrical manufacturer on a compact motor with printed circuits.



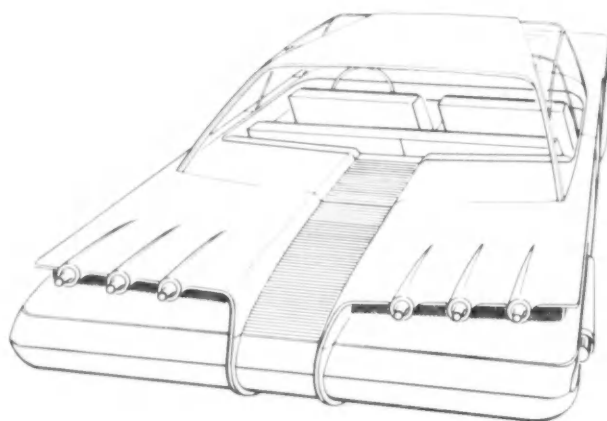
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be building
this car?

...using the highest-quality aluminum
now being produced in America?





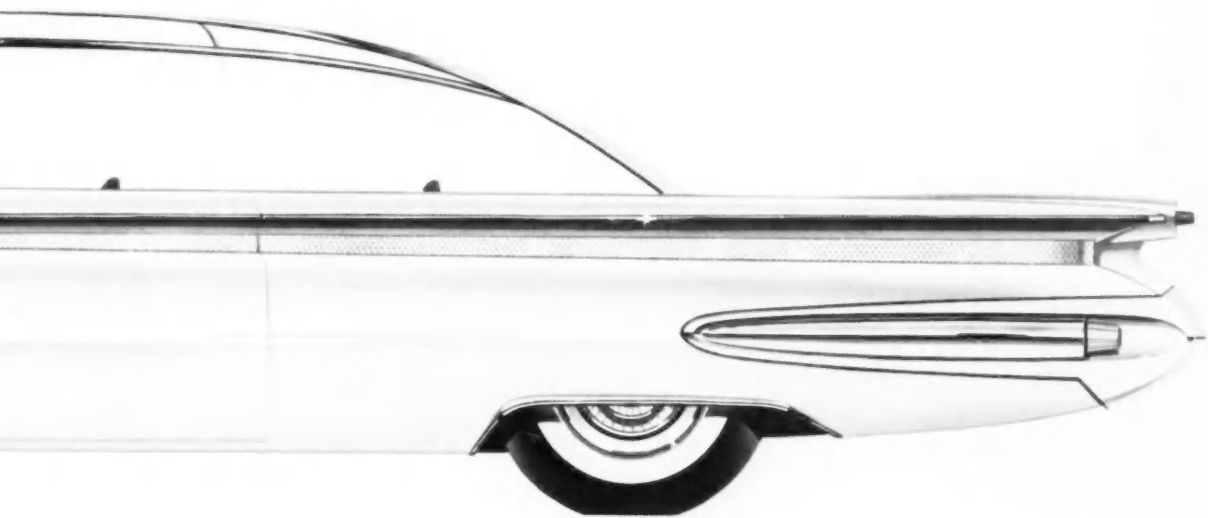
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Ask us, if you like, this question:

ference In Aluminum From Ravenswood?" (and please turn to back page)



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Located on the Ohio River at Ravenswood, West Virginia, the new Kaiser Aluminum plant gives fast service to the automotive industry for products such as coiled sheet, flat sheet and blanks.

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Six quality control checks are key elements in the aluminum production process at the Ravenswood rolling mill: quantumeter analysis, vacuum freeze test, ingot sonic test, surface

characteristics test, in-process fabrication check and final inspection.

These unique quality control standards are Ravenswood's way of making sure that the plant turns out exactly what the customer orders.

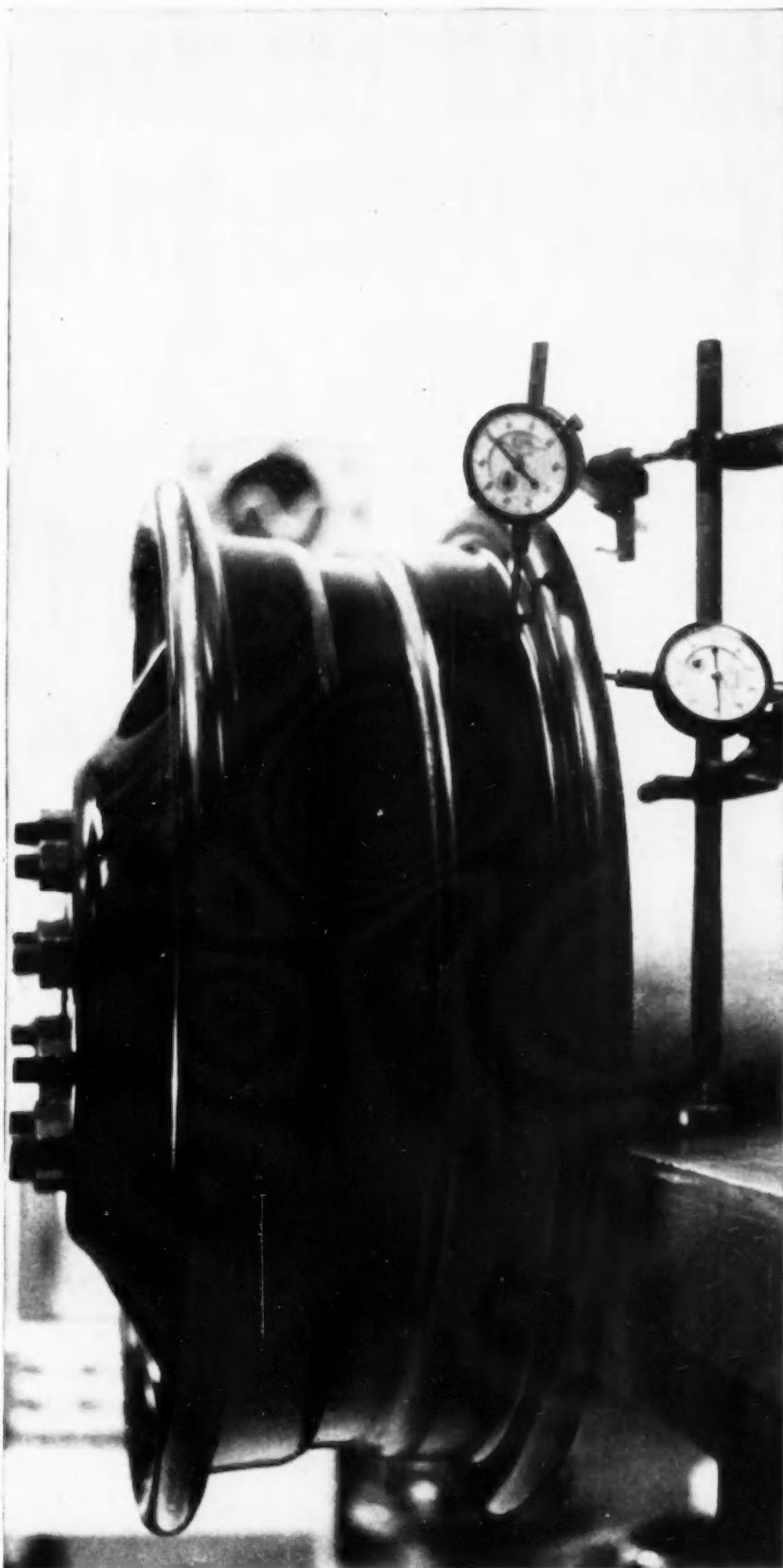
End-Use Performance Checks

In another unique Ravenswood service, each customer's metal is checked for performance *according to the customer's own fabrication methods*. Before the metal leaves the mill, each order is tested in facilities which duplicate, on a pilot scale, the actual

production equipment used in customers' own manufacturing plants.



The full resources of Kaiser Aluminum's Ravenswood plant are yours to draw upon. Let us give you specific details of how Ravenswood availability and service can benefit you. Call Kaiser Aluminum & Chemical Sales, Inc., Automotive Industry Division, I.B.M. Building, Detroit 2, Michigan. Phone TRinity 3-4000.



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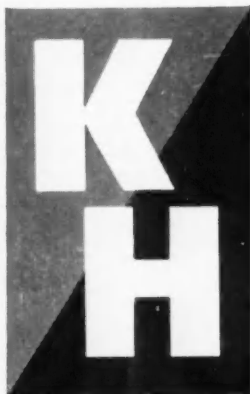


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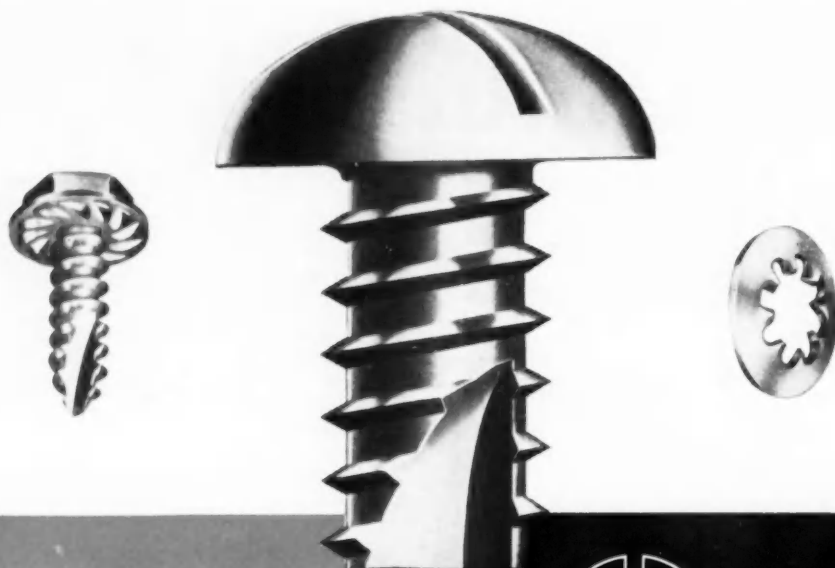
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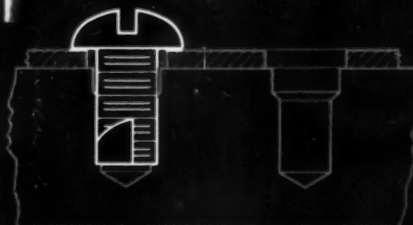
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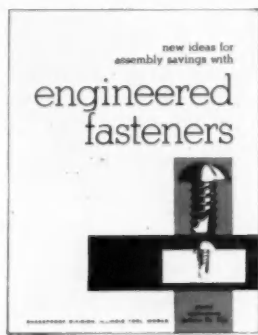
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WRITE FOR NEW SHAKEPROOF BULLETIN NO. 300 Shakeproof Bulletin 300 shows ten typical, profitable applications of Shakeproof fasteners on products using plastics. Offers free samples for testing. Send for your copy now.



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NEWS

FEATURES

Valiant Wagon

Chrysler's Corp.'s Valiant Suburban station wagon, only compact wagon in the Big Three, ranges in price between \$2164 and \$2350, at the factory. Production of the Suburban got under way in Hamtramck, Mich., the first week of November.

The four-door station wagon is available in both the V-100 and V-200 series, with two or three seats. Equipment, options and dimensions are the same as for the sedans announced earlier, except for 1.1 in. extra overall length in the three-seaters.

Factory prices are: V-100 two-seater, \$2164; V-100 three-seater, \$2278; V-200 two-seater, \$2236; and V-200 three-seater, \$2350. These do not include Federal, state or local tax, distribution, handling or dealer delivery charges.

Renault to Boost 1960 Car Output

Renault plans to increase its output approximately 30 per cent during 1960 to "keep abreast of competitors." Pierre Vignal, general export manager of the Paris-based firm, says it is necessary to keep up or "face the danger of being put out of business."

Renault currently is building at the rate of 2300 units a day. Planned volume for 1960 is 3000 units daily.

The French firm is strong in export, selling in 98 countries. During the first half of 1959 exports totaled 131,608 vehicles, or 53.5



Four-door Valiant wagon is offered in two series

per cent of total output. Renault expects to build 450,000 cars and 63,000 other vehicles worldwide during 1959.

S-P Fleet Sales

Fleet sales, with a strong backbone of taxicab deliveries, are taking eight per cent of Studebaker-Packard's 1960 Lark production. The company says more than 9000 deliveries have been made for commercial fleets. S-P claims 8.3 per cent of the New York City taxicab sales, better than half of the cab market in Kansas City and Pittsburgh.

Aluminum Muffler

A cast aluminum muffler, weighing 60 per cent as much as present mufflers, has been developed by Centr-O-Cast and Engineering Company in Detroit.

The muffler, according to Centr-O-Cast president L. W. Wickson, has been tested at road speeds of 110 mph and faster, but the maxi-

mum heat recorded was at least 300 F below the temperature that would affect performance.

Fast warmup and controlled heat distribution achieved by variations in wall thickness minimize condensation and prevent internal corrosion, says Wickson.

Centr-O-Cast and Reynolds Metals Co. have been working together on the aluminum muffler project.

Custom 300 Reinstated

Ford Div. has followed Chevrolet's lead in bringing out two stripped sedans priced for fleet purchases. The division has reinstated the Custom 300, which was not included in the original 1960 line, and priced the models \$25 below the lowest priced Fairlane.

The six-cylinder two-door Custom 300 carries a factory suggested list price of \$2,026, and the four-door is \$2,076.

Chevrolet earlier announced Biscayne Fleetmasters with identical prices.

AI TABLOID

AC Spark Plug is producing a new electronic device that will test spark plugs while they are still in position on the engine. The new instrument, called ACilloscope, is attached to the car's distributor and battery, from which it receives its power. It can detect a shorted plug, too wide or too narrow a spark gap, or lead fouling. AC engineers say.

Speeds ranging from 165,000 rpm to 500,000 rpm can be achieved with gas-lubricated bearing, says Prof. D. D. Fuller of Columbia University. Advantages claimed over oil-lubricated bearings: greater stability at extremes of temperature, absence of contamination; lower friction, greater reliability and longer life.

Automobile companies tested their 1960 model cars more than 30 million miles on proving ground roads before the products were released to public, according to the Automobile Manufacturers Association.

Westinghouse Electric Corp. announced plans to pool its technical resources in a centralized research and development center located 10 miles from downtown Pittsburgh. The new center, slated for completion in 1961, will have 712,000 sq ft of floor space and house some 450 individual scientific laboratories, Westinghouse says.

General Electric Co. is building a \$14 million space technology center for research and development near Valley Forge, Pa. The center will include a Missile and Space Vehicle Dept. building, the Aerosciences Laboratory, and an engineering facility.

Sheffield Corp. is studying (under Air Force contract) the use of ultrasonic techniques in grinding high-strength alloys. Tests with high-frequency devices capable of producing 20,000 or more vibrations a second will be carried out

on conventional grinding machines.

Dunlop Tire & Rubber Co. is studying the commercial possibilities of a new type of tire that has been used successfully on racing cars in England. A unique feature of the tire is a steel mesh embedded beneath the surface tread, which makes it ideal for high-speed cornering, according to Dunlop.

Battelle Memorial Institute scientists claim they have successfully melted commercially pure titanium charges (about 2 in. in diameter by 5 in. long) in a water-cooled copper crucible using induction heating. In a typical case, melting was completed in 2 minutes with a total power input of 80 kilowatts. The new process lends itself to continuous melting and casting of ingots, or casting directly from the crucible, Battelle says.

A University of California research worker has developed an inexpensive mixing device that changes the composition of car exhaust. Mounted on top of the carburetor, the device injects additives into the air stream. This lowers the peak combustion temperature, thereby lowering production of nitrogen oxides.

General Electric Co. has come up with a device that converts heat directly to electricity by passing hot gases through a cold magnetic field. The system has an efficiency of about 50 per cent and it developed about 1 kilowatt of power for five seconds in a recent experiment, GE said.

Bendix Aviation Corp. announced it is working on a solid-state automatic pilot with no moving parts. Besides eliminating rotating shafts, gear trains, cams, motors, and relays, this development would mean a big cut in size, weight, and cost of flight control systems plus an appreciable rise in reliability, Bendix said.

AMC Sales Soar

American Motors sales and orders for 1960 models have been running ahead of production, and production has been running strong. AMC was the last of the car companies to feel the effects of the steel strike, running Saturday shifts right into November. But Romney says dealer orders for November and December are 131 per cent ahead of last year and well ahead of output.

Ford Workers Earn More

Ford Motor Co. reports its hourly workers earned an average of \$122.85 a week during the first nine months of 1959, with an average of 42.8 hours a week. The hourly pay averaged out at \$2.87 during that period. A year ago, average hourly pay was \$2.66, weekly gross was \$99.16 and the work-week averaged 37.3 hours.

Detroit area Ford workers hit a new high with \$2.92 an hour and \$122.24 gross per week.

Fiat to Expand

The Argentine government has approved a plan by Fiat of Turin, Italy to build cars and trucks in that country.

Fiat plans to invest some \$18 million to expand its Cordoba plant for the production of the Fiat 600 and 1100 cars and the OM Tigrotto truck. The plant now is building tractors, Diesel engines, and railway equipment.

During the first year of production, Fiat expects an output of 2000 Model 600 cars, 2500 Model 1100s, and 500 trucks. By the end of the fifth year, output is slated to hit about 20,000 cars and 1000 trucks. Production of the small car would be 60 per cent domestic in the first year and 90 per cent domestic in the fifth, Fiat said.

Rootes Unveils '60 Line

Rootes Motors, Inc. unveiled a complete line of eight cars for 1960 in New York City on Oct. 27.

The 1960 line-up featured an all-new sports convertible — the Sunbeam Alpine—designed specifically for the U. S. market. Other cars in the line include the Hillman Minx 4-door deluxe and special sedans, convertible, and 4-door Estate Wagons; the Sunbeam Rapier 2-door hardtop and convertible; and the Hillman Husky utility station wagon.

Priced at \$2599 (p.o.e.), the Sunbeam Alpine is completely new from the ground up, according to Rootes officials. It is powered by a four-cylinder, 91.2-cu in. engine that develops 83.5 bhp at 5300 rpm. Compression ratio is 9.2 to 1; bore and stroke, 3.11 in. and 3.00 in. respectively.

The body is of unitized construction with independent front coil springs and semi-elliptic leaf springs on the rear wheels. Wheelbase is 86 in., overall length, 155 in. and overall width, 60 in.

Alpine styling features include a sweeping front fender line blending without a break into the rear fenders, a wraparound windshield, streamlined hood, and sharply breaking tail fins.

A detachable hardtop is available as optional equipment. The standard top can be quickly raised or lowered by one person. When not in use it folds neatly into a hidden compartment in back of the rear seat.

Cancer Study Grant

The Sloan-Kettering Institute of New York has received a \$50,000 grant from General Motors for study of the relation of automotive exhaust gases and human cancer. The Institute will analyze tar samples collected from various exhaust gases.



The all-new Sunbeam Alpine is designed specifically for the U. S. market

AMC Steps Up Expansion Program

American Motors is spending another \$14.5 million to relieve a plant situation which has been described as "bursting at the seams." The company has begun a crash program to convert a Kenosha, Wisc., furniture factory for body production.

AMC president George Romney says the conversion already is under way, should take about seven months. When completed, the new facility will give AMC 35 per cent more body manufacturing capacity.

Romney stressed the fact that the plant conversion is an emergency program and does not replace any of the company's other expansion plans. AMC recently began a separate \$17.5 million expansion program at the Kenosha plant to increase output of six-cylinder engines and provide more axle and machining capacity.

AMC is leasing the Simmons Co. steel furniture plant from the Kenosha Harbor Development Corp., present owners. Romney says the possibility of further expansion at the Milwaukee body plant still is under study.

Present capacity is 500,000 cars annually, and Romney says the cur-

rent plan is to boost production above the 600,000-car rate during the second half of 1960.

American Motors has been feeling the sweet strain of success in its Wisconsin operations for several years, but until now there have been means available internally to cope with production schedule increases. In the spring of 1958, when capacity was estimated at 250,000 units, AMC began to expand. At the beginning of the 1959 model year capacity was rated at 300,000 units, and by the end of the model run it was up to 440,000.

During the past model year AMC spent approximately \$10.5 million on internal expansion at both Kenosha and Milwaukee. Body capacity at Kenosha currently is 1900 a day.

Ford Names Agency

M-E-L Div. of Ford Motor Company has named Kenyon & Eckhardt, Inc., as advertising agency for Lincoln and Lincoln Continental cars. K&E replaces Foote, Cone & Belding, which handled the account since December of last year.

NAVY HU2K BEING FLIGHT TESTED



The Navy's new all-weather helicopter, HU2K, is now undergoing flight test at Kaman Aircraft Corp.'s Bloomfield, Conn., facilities. The Navy is expected to order about 250 HU2Ks to replace utility helicopters now operating with the fleet. Volume production of the turbine-powered aircraft is slated to begin early next year.

Earth-to-Space Ferry Designed by Lockheed-Hughes Team

Plans for an earth-to-space shuttle system that would service orbiting space stations were revealed by Lockheed and Hughes Aircraft companies.

The system could carry up to four astronauts plus large amounts of materials. It would orbit at 300 to 500 miles altitude, rendezvous with other spacecraft, and transfer technicians and supplies. It would then return to earth and repeat the entire operation—all on a routine schedule.

The proposed vehicle, called a "space ferry" also could perform other missions, according to the Hughes-Lockheed team that designed it. These include tracking unidentified objects; serving as a "space sweeper" to remove derelicts from spacelanes; acting as a testing and training facility; and carrying out short-term scientific missions.

The space ferry could carry out a typical service mission in two to ten orbits lasting three to twelve hours. It could carry a 14,000-lb payload.

At time of launch the ferry would have a "folding arrow wing

configuration," the companies said. It would house the payload cylinder and be mounted atop a 3-stage rocket weighing about 1 million lb.

The ferry would be programmed to arrive in space near its target station. It then would change to a flying wing configuration, unfolding a 1000-sq ft wing and exposing the payload cylinder.

The pilot then would take control of the craft and maneuver it into position by reaction jets spaced along the wing edges and electrically driven inertia wheels. After the ferry was fastened onto the station, the passengers—dressed in space suits—would walk through an airlock or simply step from the ferry to an external platform.

The Lockheed-Hughes team said re-entry could be accomplished by use of advanced materials plus a unique control system designed by Hughes. This system would control extreme temperatures and smooth out the flight path to a relatively gentle glide approach, the team reported.

Lockheed's California Div. is serving as technical systems manager of the project, while Hughes

is responsible for control, communication, and instrument systems.

The space ferry could be ready for service by the mid-1960s, the companies reported. The design has been submitted to the appropriate Government agencies, they added.

Heat Shield Tested

A plastic shield that may be used as a heat barrier in America's first manned flight into space was successfully tested in September.

P. W. Perdriau, general manager of B. F. Goodrich aviation products, said the heat shield "performed as planned" in a round-trip test run into space and back.

In the test, a full scale model of the Project Mercury capsule was boosted 100 miles into space atop an Atlas ICBM. The capsule reentered the earth's atmosphere at an altitude of 250,000 ft, traveling 14,000 mph, Perdriau said.

The shield, was attached to the extreme forward part of the capsule. Shaped like a broad shallow dish, it is faced with several inches of fiberglass-resin compound that melts and runs off under intense heat.

The outside skin of the shield reached a temperature of about 3000 F 50 to 30 miles above the earth, Perdriau said. At the same time, the air only a few inches ahead of the capsule hit a temperature of about 10,000 F for a few seconds.

Inside the capsule's pressure vessel, temperatures stayed below 150 F during the critical moments of re-entry. This is the area—only a few inches away from the outer skin of the heat shield—that will be occupied by the astronaut.

Detailed specifications for the heat shield and material were developed by General Electric Co. The work of laminating the material and forming the shield was

done at the B. F. Goodrich Akron, O., plant. The shield was then sent to GE's Philadelphia missile plant for final machining and installation of sensing devices.

Nuclear Rocket Study

Lockheed Aircraft's Georgia Div. was chosen by the National Aeronautics and Space Administration to conduct studies of a new nuclear rocket system.

Lockheed was one of seven companies that submitted bids to NASA on the project, which is expected to take more than three years and cost more than \$1 million.

Work will be done by Lockheed's Nuclear Products, a branch of the Georgia Div. The main part of the study will be run at NASA's Plum Brook reactor facility, near Sandusky, O. Lockheed will be responsible for designing, installing and operating the tests at Plum Brook, the NASA said.

Aerojet to Probe Exploding Wire

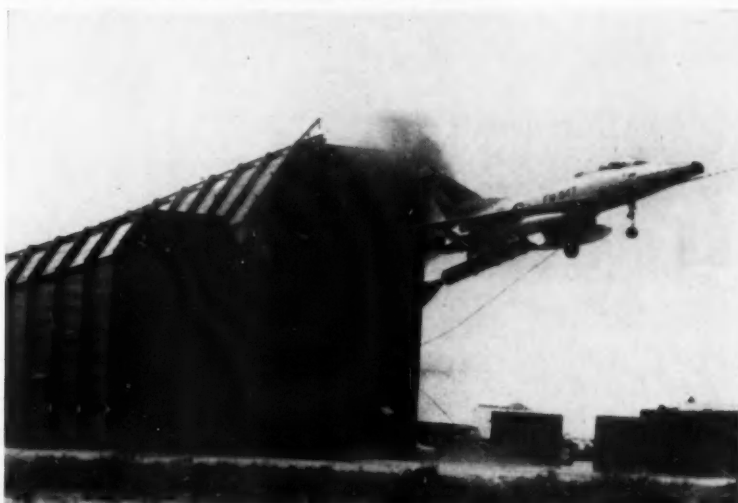
Aerojet General Corp. has received an Army contract to do basic research studies of exploded wire and films. Work on the project will be done by the firm's Ordnance Div., under the direction of Guy C. Throner.

The phenomena, according to Throner, occurs when a large electrical current is passed through a small wire, causing it to explode. Because of the very high temperatures it generates, the exploding wire may someday play an important role in missiles and rockets, Throner pointed out.

Vertol Grants Option

New York Airways has entered into an option agreement to buy the first five Model 107 helicopter air-

JET FIGHTER LAUNCHED FROM SHELTER



An F-100 Super Sabre proves a jet fighter can take off from a shelter designed to withstand an atomic blast. The Zero Length Launch of an Air Research and Development Command plane was made at Holloman AFB, New Mex.

liners built by Vertol Aircraft Corp. Delivery would be made early in 1961.

The Model 107 will be powered by General Electric CT58 shaft turbine engines and will carry 25 passengers. It will have a cruising speed of 155 mph and a normal operating range of 115 miles with fuel reserve for an additional 20 minutes of flight.

The 107 airliner is an advanced version of the Army's YHC-1A light tactical transport helicopter. It will sell for approximately \$470,000 plus cost of engines.

Space Projects to Get More Funds

Federal spending to unlock the mysteries of outer space is down for a sharp rise in the new budget. The exact amount will be disclosed when President Eisenhower sends his spending estimates for the 12-month period starting July 1 to the Congress in mid-January.

Saturn, the super-booster (1,500,000-lb thrust) developed by the Army, is now included in the budget of the National Aeronautics and Space Administration. Saturn cost \$34 million in the fiscal year that ended last June 30. It is down for \$70 million in this fiscal year.

Dr. Werner von Braun, probably the nation's leading rocket scientist, says the project needs an additional \$50 million in this fiscal year, bringing the total for this project alone to \$120,000,000.

Saturn is capable of putting a man into flight through space. It can thrust 30 tons into a 300-mile orbit, or it can send a vehicle around the moon. It is due for a ground test early in 1960, and may be tested in flight within a year.

Scientists warn that space exploration is going to cost staggering sums of money within a few years. Current rate of spending is peanuts, compared to what we must set aside for space exploration in the near future, Congress is told.



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The Buick '60 is equipped with N/D bearings in front and rear wheels, fan and water pump,

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NEW DEPARTURE
BALL BEARINGS

proved reliability you can build around

MIEN

IN THE NEWS



Greenlee Tool Co.—M. J. Tuckett was appointed general sales manager.



ACF Industries, Inc., Carter Carburetor Div.—F. Schreiner is now general manager of distributor sales.



Universal - Cyclops Steel Corp.—D. P. Boor has joined the Detroit District Sales office and will specialize in stainless strip sales.



Stewart - Warner Corp., Electronics Div.—J. O. Coffey was made sales manager of aircraft and military products.



Curtiss - Wright Corp.—H. P. Valentine is now director of sales.



Chrysler Corp.—W. C. Cawthon was appointed general purchasing agent.

Electric Autolite Co.—J. Winslow, R. Stott, and H. Seubert have been named chief engineers of the starting motor section, generator section, and distributor section, respectively.

U. S. Rubber Co., Tire Div.—J. W. Lynch was made manager of U. S. passenger tires; D. F. Gross, sales manager for Fisk tires; and J. R. Tully, field sales manager for U. S. tires.

American Brake Shoe Co., Denison Engineering Div.—W. J. Pelich is now sales manager.

Minnesota Mining & Mfg. Co.—J. C. Duke was appointed executive vice-president, sales and public relations; C. C. March succeeds him as group vice-president; and J. F. Whitcomb was promoted to general manager of the coated abrasives division.

Armstrong Cork Co.—Dr. C. E. Schildknecht has been retained as a consultant on vinyl-type polymers.

Timken Roller Bearing Co.—S. F. Bennett was named managing director of British Timken Div. and G. F. Copeland managing director of the Brazilian plant now under construction.

Dexter Co., Div. of Miehle-Goss-Dexter, Inc.—F. I. Walsh, Jr., has become vice-president and general manager.

Young Spring & Wire Corp.—N. D. Ely retired as president. I. R. Seely was named executive vice-president and T. Couper general manager of the automotive division.

Clark Equipment Co., Industrial Truck Div.—D. S. Hansen is now sales manager of the Pittsburgh district and J. D. Goodson St. Louis district sales manager.

U. S. Industries, Inc., Clearing Div.—E. P. Cunningham was named senior vice-president and J. Michelotti vice-president, manufacturing.

Bendix Aviation Corp., Utica Div.—H. Alexanderson was named director of engineering; B. Goldberg, chief engineer, current products; and H. Troeger, chief engineer, advance design.

Budd Co., Automotive Div.—W. H. Dutcher, Jr., was promoted to specialty sales manager.

Diamond Chain Co.—J. E. Cooper has been named manager of sales.

Goodyear Tire & Rubber Co.—W. G. Burket has been appointed chief engineer of truck tire design.

Gabriel Co., Gabriel Div.—R. T. Hood was made president and general manager.

Abrasive Dressing Tool Co.—W. W. Wellborn has been named vice-president and director of research and product development.

Clinton Engines Corp.—I. A. Lutz was elected senior vice-president and C. V. Erlacher, Jr., vice-president and general sales manager.

Universal-Cyclops Steel Corp.—M. Mead was named sales representative in the Detroit Sales District.

Bendix Aviation Corp.—R. C. Fuller was elected vice-president and group executive.

Massey-Ferguson—W. D. Walker was appointed director of manufacturing, North America.

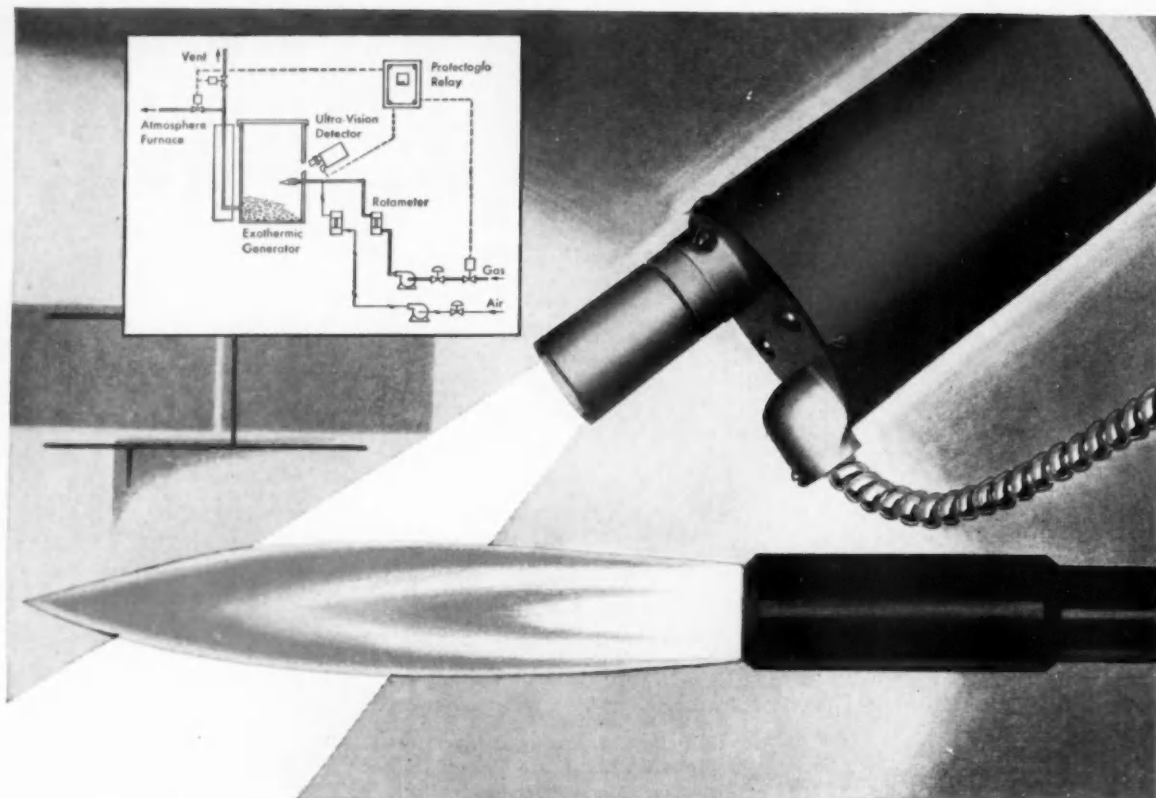
Necrology

H. W. Prentis, Jr., 75, chairman of the board of Armstrong Cork Co., died Oct. 29, at Lancaster, Pa.

L. G. Hooker, 71, president of Detroit Aluminum and Brass Corp., died Oct. 24, at Phoenix, Ariz.

V. H. Sutherlen, 45, general sales manager of Oldsmobile Div., General Motors Corp., died Oct. 26, at Ann Arbor, Mich.

J. C. Bath, 67, vice-president and treasurer of John Bath & Co., Inc., died Oct. 19.



Typical method of installing *Ultra-Vision* Flame Detector to protect exothermic gas generator.

New flame safeguard for exothermic gas generators

... not fooled by hot refractory or glowing carbon

Here's truly reliable flame protection for exothermic gas generators. The new *Ultra-Vision** Flame Detector responds *only* to the ultra-violet energy given off by flames and sparks. It can't be fooled by hot refractory. It cuts off fuel delivery on flame failure alone, and completely eliminates nuisance shutdowns.

Use the new *Ultra-Vision* Flame Detector to supervise exothermic gas generators in which temperature may range from 2300°F to 3200°F—where flame rods would rapidly deteriorate and lead sulfide cells would respond to heat.

This one unit keeps an eye on both the pilot and main flame. Use it with any standard rectification-type flame safeguard system, such as the *Protectoglo**. The *Ultra-Vision* sensor is particularly easy to install, because it is insensitive to the refractory and can be aimed at the flame from any direction.

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First in Control

A Major Advance for the Industry



an Editorial

DESPITE THE GLOOM RESULTING from the conditions imposed by the steel strike, research shows that this year America's automotive industries have made a major advance. On page 72 of this issue, appears the annual estimate of motor vehicle registrations which is compiled by Marcus Ainsworth, our Statistical Editor. Our readers will recognize this annual table as the first privately compiled and published report of estimated registrations for the year. This year, it is significant that the rate of change of total registrations annually has been reversed from the downward trend which had prevailed since 1955. For 1959, the rate of change increased almost double the 1958 rate.

This reversal is shown in detail in the following table:

Year	Total Change Compared with Previous Year
1955	+6.9%
1956	+4.0%
1957	+3.3%
1958	+1.7%
1959	+3.3%

THE TECHNICAL OR ECONOMIC ANALYST may inquire more closely into the meaning of these estimates. When he looks over comparable data classified by five year cycles, he will find that there is no clear-cut and outstanding pattern of cyclical repetition which appears. It is not characteristic for the industry to be up one year and down the next, or up two years and down two. No combination of short term trends seems to fit into a consistent repetitive pattern of data. For some portions of the total data, however, some specific conclusions can be drawn. The first general important conclusion is that trucks are generally showing a higher increase in rate of registrations than passenger cars. This is apparently because all classes of business, industrial, and farming establishments have to have a much higher degree of commercial mobility for their incoming materials as well as their product shipments and deliveries to customers.

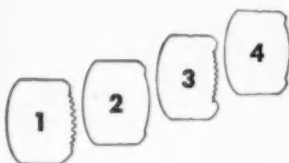
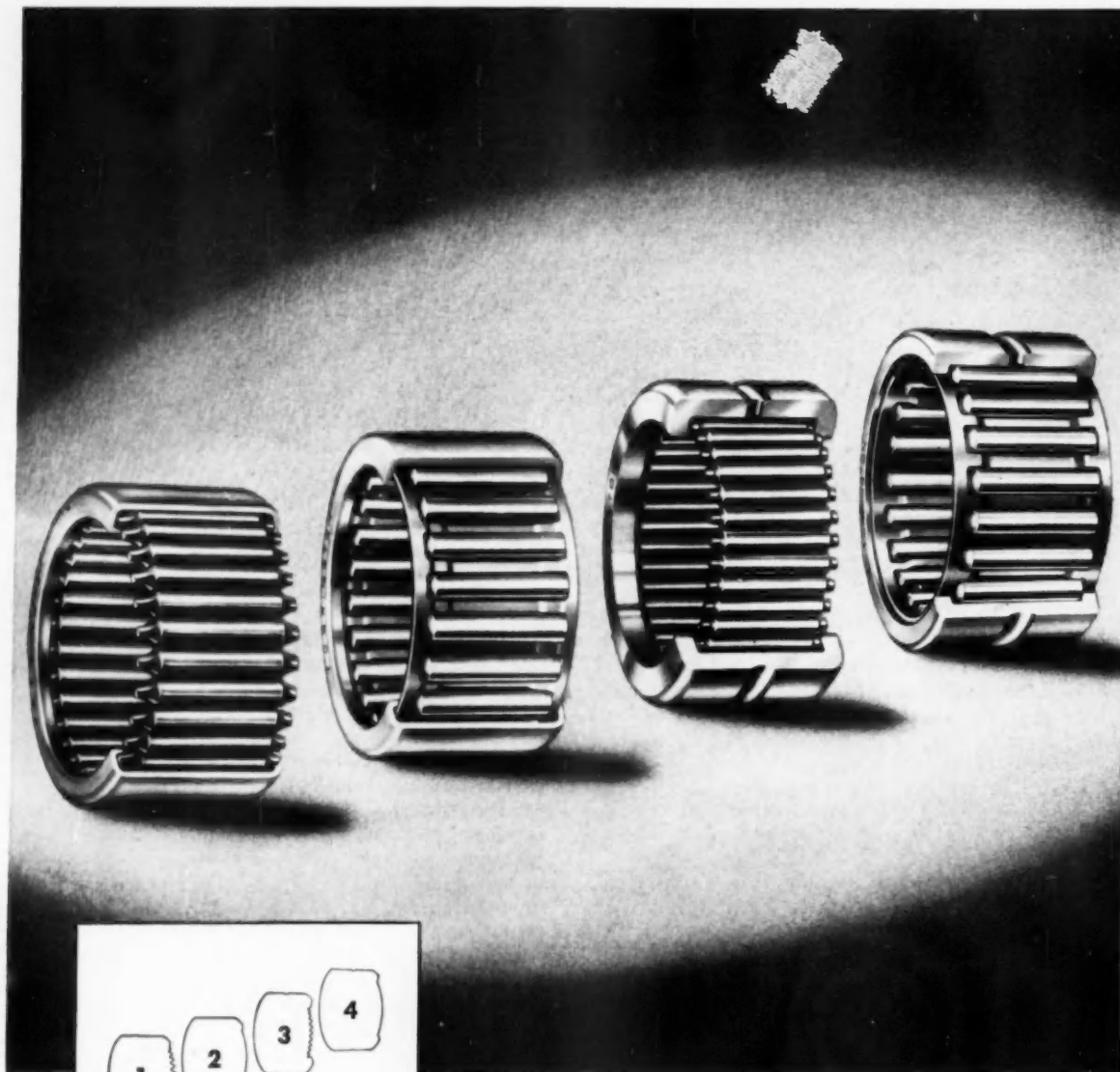
This is a vital and continuing increase in total demand for a major class of the products of the automotive industries.

FURTHER ANALYSIS of the 1959 registration data, moreover, reveals another important fact, which may not be immediately discernible in the usual variety of classifications of the short term registration data. Taking a 25-year period as the basis for a "judgment" analysis, there is one big and basic point which stands out above all others. This is the fact that despite the shorter-term up-swings and down-swings, despite the strikes in steel or any other kind of interruptions, the output of the total automotive industries products continues to grow in uses by all kinds of users. This growth characteristic is more important than any short term down-trend. It is more important than any temporary plant closing because of steel shortages. When we are thinking about our jobs and our duties in this industry, this is the thing to remember.

THE REGISTRATION DATA ESTIMATES for 1959 bring these facts sharply into focus. They remind us that new challenges of progress, of improvement, of advances in design and of advances in production will face the entire industry in 1960. With more than 70 million registered vehicles in 1959, replacement of only one out of ten with new vehicles in 1960 would mean more than a 7,000,000 vehicle sales year. Despite this strong appearance of the industry's records, we might conclude from this analysis that the entire industry still needs to take a much closer and sharper look at the effectiveness of total penetration of the remaining potential market which is still unsold on buying new cars.

Harry W. Barclay

Editor



Torrington Drawn Cup Needle Bearing...
for maximum radial capacity in minimum cross section... positioned by press fit—snap rings or shoulders unnecessary... runs directly on hardened shaft... most compact, light weight, economical.

Torrington Drawn Cup Roller Bearing...
for higher speeds or long pregreased life... thin section race for simple press fit... runs directly on hardened shafts... unit construction for easy assembly... shaft-riding retainer.

Torrington Heavy Duty Needle Bearing...
for use with thin section or split housing where extreme impact loads require heavy outer race... maximum shock resistance... full roller complement... unit construction.

Torrington Heavy Duty Roller Bearing...
for combination of high speed, long pregreased life or shock resistance... roller stability provided by end-guiding... Range-riding retainer... unit design.

All of these types of bearings are available with inner races.

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Every Basic Type of Anti-friction Bearing

NEEDLE • SPHERICAL ROLLER • TAPERED ROLLER • CYLINDRICAL ROLLER • NEEDLE ROLLERS • BALL • THRUST

RADIOISOTOPES

Advance

in Automotive Engineering

By Arthur J. Stevens, PhD

Arthur J. Stevens, PhD



ABOUT THE AUTHOR

Dr. Stevens began his career as a research chemist at Linde Air Products and later held the same position at MIT Div. of Industrial Cooperation. Following this, he was appointed chief chemist at Remington Rand's Electronics Div.

At Tracerlab, Inc., he was director of contract research. Dr. Stevens then became a vice president of Technical Operations, Inc., and subsequently president of the Gamma Corp. When The Budd Co. purchased the Gamma Corp., he was appointed a vice president at Budd, and general manager of its Nuclear Systems Div.

At the present time, he is president of Radiation Engineered Services.

A WIDE variety of automotive production materials are now improved through the use of radioisotope measuring and quality control devices and techniques. This comprehensive article tells how, where, and why these methods are used and projects some estimates of future applications which may be vitally important in automotive design and manufacturing, cost reduction, and product improvement. For clarity, in the first part of this two part article, there is a diagrammed presentation of basic automotive applications of radioisotopes.

PART I

• METHODOLOGY •

Introduction

This two-part article will review industrial applications of radioisotopes. Part I is concerned with basic concepts and describes the three most important applications—radiography, gaging and radiotracers. Part II will describe specific applications in the automotive and aircraft industries.

Although it has been estimated that the use of isotopes is now saving industry in excess of one billion dollars per year, only a very small fraction of potential industrial users are employing radioisotopes today. Dr. Libby, until recently one of the Commissioners of the Atomic Energy Commission, believes that within the next decade the economic value of radioisotopes may be measured in the tens of billions of dollars.

This increase is possible within present technology—i.e., no radically new development of use or application is required. Why, then, is not usage more widespread at present?

The answer is dual in nature, although both parts have a common basis—information. (1) Information concerning the availability, applications and potential savings to be derived has not been widely enough disseminated. (2) The unfortunate publicity the atom has received has retarded industry's willingness to utilize radioactive materials. Such efforts as have been expended under (1) have, to a considerable extent, been negated by (2). Both lack of information and improper information are almost equally responsible.

**Steady Expansion in the Applications of Isotopes
Cuts Costs and Improves Quality in Production Materials . . .
Inspection . . . Manufacturing Methods . . . and Total Quality Control.**

**Major Advances in Both Design and Production Operations
are Emerging from Use of New Facilities . . . Technology . . . and Applied Research**

The unfortunate aspect of the situation is the needlessness of hesitancy on industry's part. The hazards associated with radioactivity cannot be denied, but because of their peculiar nature, extra precautions have been taken by the manufacturers of devices containing radioactive materials to reduce hazard to a minimum. In addition, the Atomic Energy Commission exercises extensive and effective control over use through its Licensing and Inspection Divisions. All possessors of isotopes must demonstrate to the AEC that they have proper and adequate facilities, instruments and equipment, proper procedures and responsible personnel properly trained in handling techniques and associated hazards. It is safe to say that, on the average, users of radioisotopes in industry today are subject to far less risk from radiation hazard than from more ordinary industrial

hazards normally associated with manufacturing operations.

Industry's primary requirement immediately, then, is for proper information. The pay-off is enormous, even by today's standards—tens of billions of dollars every year.

One final point is of interest. The savings—and, therefore, potential income—mentioned above are possible within present technology. With new uses and applications, even greater savings are possible. And herein lies another requirement for information by industry. For new uses must, in general, come primarily from industry rather than from the nuclear experts. Only the plant superintendent or the engineer or the research director knows his own problems intimately enough to suggest potential solutions. Those skilled in nuclear applications may be able to adapt radioisotopes to

a stated problem. But, as a rule, industry must first state the problem. A limited, but reasonable knowledge of nucleonics by people in all areas of industry would, without question, stimulate new applications.

Ionization

The bulk of industrial applications of radioisotopes employ either beta emitters or gamma emitters. The usefulness of both radiations depends on their ability to produce ionization. This process is the removal of an electron from an atom in the absorbing material, leaving that atom with a net positive charge. The removed electron usually becomes attached to another atom or molecule, giving it a net negative charge. The two charged atoms or molecules are called an "ion pair." The original ionizing ray (beta or gamma) loses only a fraction of its energy in the formation of the ion pair, and continues onward to produce many more such pairs along its path until its energy is finally expended.

Radiation Detection

All radiation detection instruments are, in essence, ion pair detectors. Components and circuitry vary from instrument to instrument, but all function only because of ionization produced within their sensitive volumes.

Radiation Absorption

A given thickness of material will always absorb the same fraction of beta or gamma radiation impinging on it. Thus, for any given isotope, each absorbing material has a characteristic half value layer—that thickness which absorbs half the radiation impinging on one side. (See Fig. 1).

TERMS

A number of terms are in common use in nuclear technology.

Curie—a measure of quantity of radioactive material. One curie of radioactive material contains 37 billion atoms disintegrating every second. One curie of radium weighs approximately one gram, but it may weigh much more or much less for other isotopes. A millicurie is one thousandth part of a curie (37 million disintegrations per second).

Roentgen—as commonly used, a measure of radiation dose. Actually a measure of the energy of ionization produced by x-rays or gammas in air. Strictly speaking, the roentgen-equivalent-physical (REP) should be used for materials other than air. In humans, the term used is roentgen-equivalent-man (REM). As an example of magnitude, new regulations call for a five roentgen per year limit as the maximum permissible dose for radiation workers over the age of 18. A milliroentgen is one thousandth part of a roentgen.

MeV—million electron volts. The electron volt is a measure of energy of radiation, and therefore generally, within a radiation specie, a measure of the penetrating power of radiation. A soft beta or gamma has less energy or fewer MeV, and less penetrating power than a hard beta or gamma. More exactly, one electron volt is that kinetic energy acquired by one electron in dropping through a potential field of one volt.

ENGINE

Radiography
Engine block
Crankshaft

Gaging
Gaskets

Tracers
Piston & ring wear
Oil lubricity
Bearing wear
Sparkplug research
Point wear
Valve corrosion
Muffler corrosion

RUNNING GEAR

Radiography
Brake drums

Gaging
Spring steel
Tire plies
Wheel steel

Tracers
Rubber structure
Rubber oxidation
Rubber compounding
Tire wear
Bearing wear
Brake lining wear

WINDOWS

Gaging
Glass
Safety glass interlayer
Rubber gaskets

Tracers
Glass research

INTERIOR

Gaging
Upholstery
Foam rubber
Plastic sheet
Seat covers
Temporary seat covers
Door panels
Kick plates
Welting
Floor covering

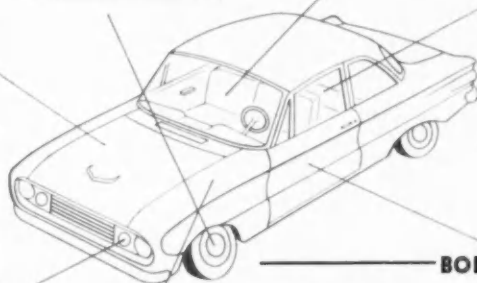
Tracers
Metal cleaning studies
Paint research

ELECTRICAL SYSTEMS

Radiography
Oil level in coils

Gaging
Battery separators
Battery plates
Printed circuit laminates

Tracers
Battery research
Wire die wear
Insulator research

**TRANSMISSION**

Radiography
Castings

Tracers
Gear wear
Oil lubricity

BODY

Radiography
Frame welds

Gaging
Stainless trim
Body sheet metal
Chrome plate
Gaskets
Convertible tops
Temporary con-

vertible tops

Tracers
Metal cleaning studies
Paint research
Steel production
Plating research
Plastics research
Corrosion studies

SOME OF THE ISOTOPE APPLICATIONS IN AN AUTOMOBILE**Half Life for Decay**

Each individual atom of a particular radioactive species has the same probability for decay within a given time period. However all atoms do not decay at a given instant. Some decay more quickly than others. The statistical result is so-called exponential decay, as illustrated in Fig. 2. The half life of a given isotope is that time required for the original quantity to be reduced to one half, and it is always the same time period for that isotope, regardless of the initial amount.

Note that extrapolation to mathematical absorptivity would indicate that the radioactive material would never disappear entirely, since one should always have half as much

left as was present one half life earlier. In reality, eventually a single remaining atom is reached, which must eventually decay, leaving no remaining material.

Half lives spread from very tiny fractions of a second to billions of years. Practically speaking, the half life of an isotope for industrial use must be at least a few months to avoid too frequent source replenishment.

Inverse Square Effect

All radioactive sources emit radiation in all directions simultaneously. Thus the further the detector is from the source, the smaller fraction of the total radiation it will intercept. If the distance is doubled, only one quarter of the

instrument response will be obtained. At ten times the distance, only one per cent of the original intensity is measured. The instrument output is reduced by the square of the inverse ratio of the distances—hence the term “inverse square effect.”

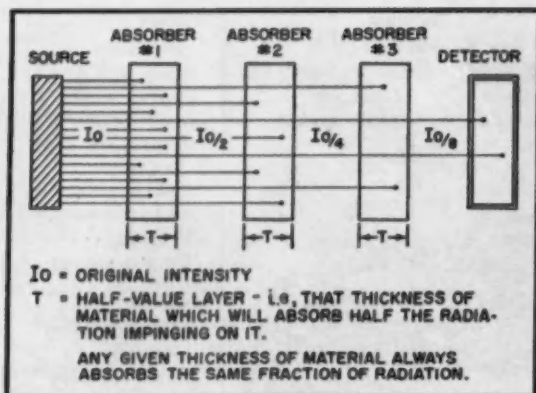
$$I_2 = I_1 \left(\frac{D_1}{D_2} \right)^2$$

where I_1 and I_2 are the intensities measured at distances D_1 and D_2 respectively.

Induced Radioactivity

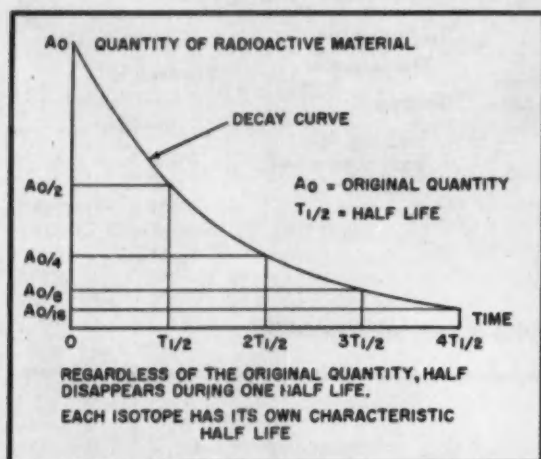
One final point is worth mentioning, only because of widespread misunderstanding. With very few exceptions found usually in the laboratory or in nuclear reactors, the

FIG. 1



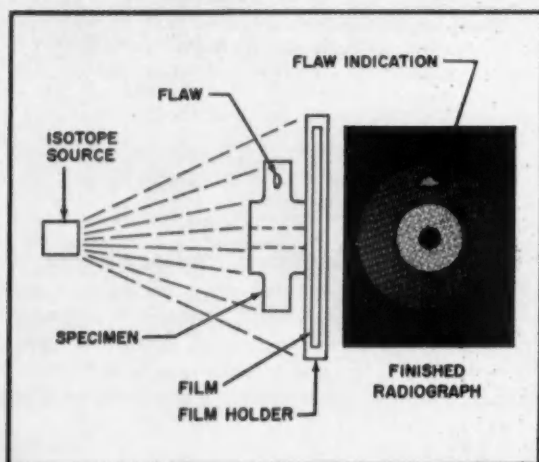
Absorption of radiation

FIG. 2



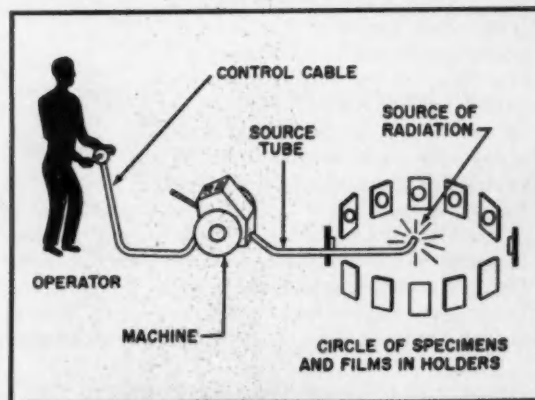
Half life for decay

FIG. 3



Principle of isotope radiography

FIG. 4



Panoramic isotope radiography

radiation (alpha, beta or gamma) from radioactive sources does not induce radioactivity in other materials exposed to it. No industrial product employing radioactive materials is capable of producing radioactivity in its surroundings or materials exposed to the radiation.

The bulk of industrial applications of isotopes fall into three basic use areas: radiography, gaging and tracer techniques.

INDUSTRIAL APPLICATIONS

RADIOGRAPHY

Isotope radiography is as old as radium, but until the nuclear reactor was developed and large quantities of inexpensive isotopes became available, the high cost of radium limited applications and techniques.

Principles

The principle of isotope radiography is essentially identical to those of x-radiography, except that a radioactive source replaces the x-ray machine. Gamma radiation from a sealed source (usually cobalt 60 or iridium 192) passes through the specimen and impinges on a sheet of x-ray film in a light-tight holder. A flaw in the specimen, usually a void, represents less material for radiation absorption, so more radiation reaches the film over the area of the flaw. Upon development of the film the flaw shows up as a darker spot. See Fig. 3.

Techniques

Two general techniques are in use. The panoramic technique takes advantage of the fact that sources emit radiation in all directions. The source is suspended in the center of a circle of castings, each with its own film, exposing them all simultaneously.

Or the source may be located on the axis of a tank

or pressure vessel, allowing an entire girth weld to be radiographed at once as shown in Fig. 4.

The beam technique involves a machine which shields the source entirely except for a beam which may be directed as desired. Beam producing machines are ordinarily used for stronger sources, or where radiation exposure with the panoramic method might preempt too much floor space. See Fig. 5.

Sources

Several radioisotopes are used for industrial radiography, but cobalt 60 and iridium 192 are by far the most common. Radium is still used to a limited extent. Cesium 137 and thulium 170 have recently been used for some applications. Table I gives some of the properties of these isotopes.

The lower limit of the range of any isotope is established as the thinnest section in which a sensitivity of two per cent can be obtained. Sensitivity is usually considered adequate when a flaw whose smallest dimension is two per cent of the thickness of the metal section can be detected. Thus, for iridium 192, the smallest flaw that can be detected is 0.005 in. in diameter in 0.25 in. thick steel, or 0.015 in diameter in 0.75 in. thick aluminum.

The upper limit of range is usually determined by practical considerations of exposure time. The thicker the metal section, the longer the exposure time required. For example, with cobalt 60 the exposure time doubles for approximately each inch of steel.

Since, in steel, the ranges of iridium 192 and cobalt 60 overlap, a radiographic facility possessing both sources has a radiographic capability in steel of from 0.25 in. to over 12 in. Radium and cesium are not usually necessary. The addition of a thulium source extends the lower limit of range down to about a tenth of an inch.

Applications

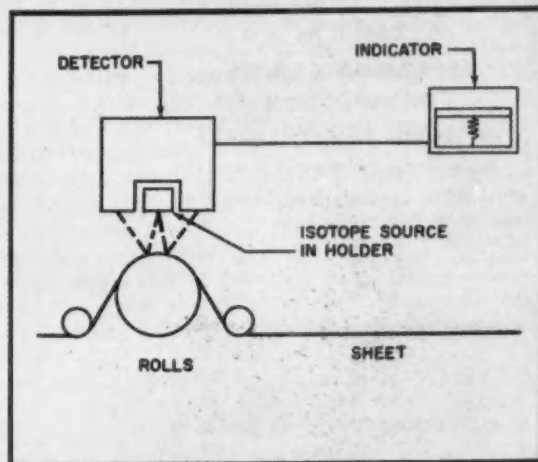
Radiography is a nondestructive testing method. Internal flaws may be located and evaluated without

destroying the piece. Its principal value lies in quality control. Although specifications occasionally call for the inspection of every casting or every inch of weld, usually a sampling method is used as a quality control check on production. In the foundry, radiography, serves as a tool for evaluating and controlling foundry practice. Judicious radiography while running in a new pattern can be an invaluable aid to the metallurgist, engineer or superintendent. Gates and risers can be located to best advantage before actual production begins.

In welding, radiography serves as an effective check on the continued efficiency of the welder.

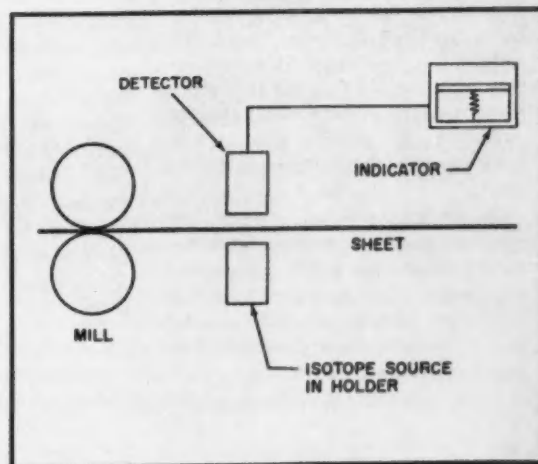
In general, radiography is useful wherever metal has been fused—i.e., in casting and welding. More

FIG. 7



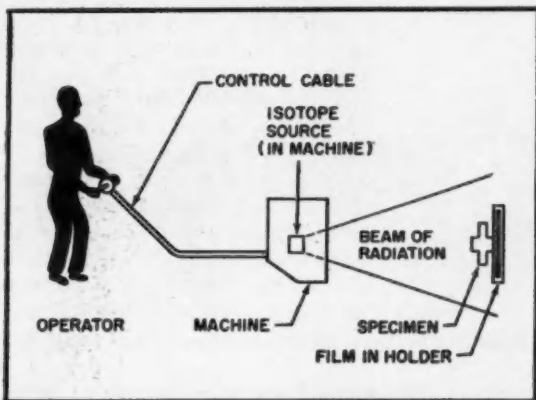
Back scatter isotope gage

FIG. 6



Transmission isotope gage

FIG. 5



Beam isotope radiography

RADIOGRAPHIC RANGES OF SOME RADIOSOTOPES

Isotope	Relative Energy of Gamma	Material Range (In.)	Half Life
Cobalt 60	1.25	Steel 1-12	5.2 years
Radium	1.0	Steel 1-5	1600 years
Cesium 137	0.66	Steel 0.5-5	30 years
Iridium 192	0.35	Steel 0.25-2.5 Aluminum 0.75-8	75 days
Thulium 170	0.1	Steel 0.1-1 Aluminum 0.25-3	139 days

TABLE I

TABLE II
RADIOACTIVE SOURCES FOR GAGING

Isotope	Radiation	Relative Energy	Material	Theoretical Limiting Sensitivity (In.)	Half Life
Promethium 147	Beta	0.223	Paper, Plastic	0.000002	2.6 years
Krypton 85	Beta	0.65	Aluminum Paper, Plastic	0.000003 0.000008	10.27 years
Strontium 90	Beta	0.61, 2.15	Steel Aluminum Paper, Plastic	0.000005 0.000015 0.00004	25 years
Cesium 137	Gamma	0.66	Steel Aluminum	0.0004 0.002	30 years
Cobalt 60	Gamma	1.25	Steel Aluminum	0.001 0.003	5.2 years

TABLE III
APPROXIMATE LIMITS
OF DETECTION
OF SOME RADIOSOTOPES

(as represented by 10 disintegrations per second)

Isotope	Half Life	Micromicrograms (10 ⁻¹²)
Cesium 137	30 years	3.1
Antimony 125	2.7 years	0.26
Cerium 144	282 days	0.064
Phosphorus 32	14.3 days	0.00095
Arsenic 77	38 hours	0.00025

specific examples will be given in Part II.

Costs

Initial capital outlays for isotope radiography equipment and facilities are usually only a fraction of similar costs for comparable x-ray installations. Costs per radiograph, exclusive of amortization, are similar for the two processes, except where the greater versatility of isotopes may permit labor savings due to reduced set-up time.

As an example, an iridium 192 machine may be purchased for between \$1600 and \$2500, depending on model and capacity. Annual costs for the replacement of decayed sources usually range from about \$1000 to \$1500.

Cobalt equipment costs run from

about \$2000 for a small (3 to 5 curie capacity) unit to about \$13,000 for a large (1000 curie capacity) machine. Annual costs for source replacement for cobalt 60 (usually once every four to five years) are quite low—about \$50 per year for a five curie source to \$1500 per year for a 1000 curie source. It is noteworthy that a 1000 curie cobalt 60 unit, selling for a little over \$20,000, will take radiographs very comparable in quality to those obtained with a 2,000,000 volt x-ray machine, costing over \$100,000 exclusive of installation.

Comparison of Isotopes With X-Ray

Isotope radiography equipment has the principal advantages of portability, low cost and versatility in application over x-ray machines. On the other hand, x-ray is better suited for thin section or light metal radiography. Each has its area of application where it is superior to the other. The complete radiography installation usually employs both x-ray and isotopes.

GAGING

Certain radioisotopes are almost ideally suited to continuous and es-

entially instantaneous noncontacting thickness or density gaging of continually produced materials. X-ray gages are also used, but limitations on stability and thickness ranges have limited their application.

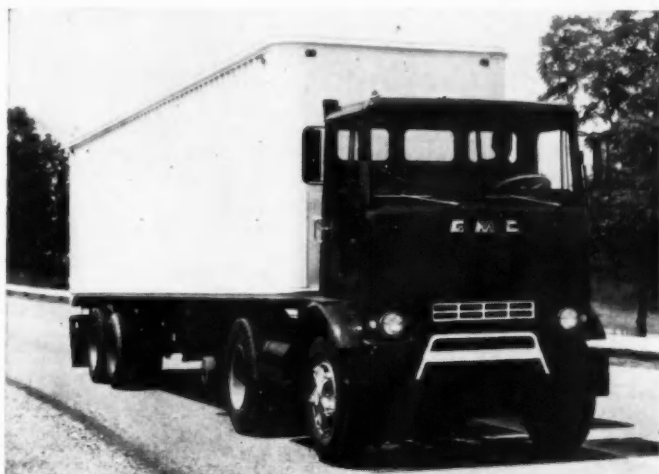
Principles

The basic principle of isotope gaging is simply one of radiation absorption. If a source of radiation is placed on one side of a sheet of continuously produced material, and a radiation detector is placed directly opposite, changes in thickness or density of the sheet will result in different absorptions of radiation, and the output reading of the detector will vary accordingly.

Two general types of quantitative gages are available. The transmission gage utilizes, as the name suggests, the direct transmission of radiation through the material being measured. Variations in thickness (or, in some cases, density) may be read out directly. If desired, the output may be used to control the process, thus providing automatic correction. See Fig. 6.

The backscatter gage utilizes both the principles of radiation absorption and radiation scatter. If a beam of radiation, particularly beta radiation, is directed toward an object, a fraction of that radiation will "bounce" or scatter, some of it directly back into the source. This phenomenon may be utilized to measure coating thickness, if the atomic number (number of protons per atom) of the coating is sufficiently different from that of the base material. Similarly, the thickness of a sheet may be measured as it passes over a roll—again, if the atomic numbers of the two materials differ sufficiently. The source and detector are both located on the same side of the strip, so arranged that a fraction of the back scattered radiation returns to the detector. As with the transmission gage, the detector output may be utilized to control the process. See Fig. 7.

(Turn to page 102, please)



The DF7000 with 48-in. aluminum tilt cab

Completely New Line of GMC Trucks for 1960

GENERAL Motors Corp., Truck and Coach Div., presents for 1960 a completely new line of commercial vehicles ranging from light pickups to heavy duty on-and-off-the-highway units.

These new trucks are completely different in appearance, styling, engine, axle, transmission, frame, suspension, wheelbase and cab design. A wider variety of models and types have also been included in the

1960 line which ranges from half-ton pickups on up to highway rigs with 120,000 lb gross weight ratings.

Powering the 61 basic new models are seven engines: three gasoline and one Diesel V-6, a gasoline Twin Six, and one gasoline and one Diesel straight 6.

With the exception of two package delivery models, all gasoline driven GMC 1960 trucks will be powered by the new 60-deg V-type engines designed and manufactured by GMC. (See AI, August 15, 1959.) In addition, GMC also has a complete line of Diesel-powered units, the majority of which are equipped with the new 6V-71 Diesel.

The new line of 60-deg V-type engines is composed of three basic V-6's, the 305, 351, 401; and the 702 Twin Six.

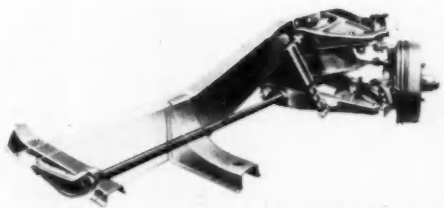
There are three versions of the basic 305 engine, the 305A, B and C. All have a 304.7 cu in. displacement and a bore and stroke of 4.25 by 3.58 in. Their horsepowers run from 150 at 3600 rpm for the 305A and 305B up to 165 at 3800 rpm for the 305C. Gross torque reaches 260 lb ft at 1600-2000 rpm in the 305A, 266 at 1200-1400 rpm in the 305B, and 270 at 1400-1600 rpm in the 305C.

Specifications of the other new gasoline engines are as follows: *The 351*—351.2 cu in. displacement, 4.56 by 3.58 in. bore and stroke, 180 hp at 3400 rpm, 312 lb ft gross torque at 1800-2000 rpm; *the 401*—400.9 cu in. displacement, 4.87 by 3.58 in. bore and stroke, 205 hp at 3200 rpm, 377 lb ft gross torque at 1400 rpm; *the Twin Six 702*—702.4 cu in. displacement, 4.56 by 3.58 in. bore and stroke, 275 hp at 2400 rpm, 630 lb ft gross torque at 1600-1900 rpm.

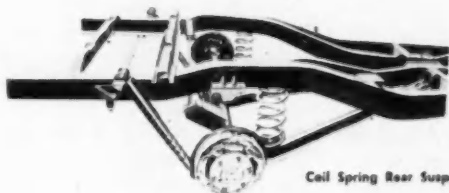
Wherever desirable in the engine line, options are offered. For example, in the 4000 Series, engine 305B, 305C or 351 will be supplied. The 305A is standard in Series 1000 through 3500. The 351 applies to the 5000 Series; the 401 to the 5500 and 6000 Series. The Twin Six is installed in the 7000 and 9000 Series.

Because of the highly developed torque character-

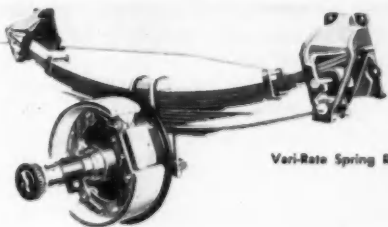
(Turn to page 112, please)



Torsion Bar Independent Front Suspension



Coil Spring Rear Suspension



Var-Rate Spring Rear Suspension

Three of GMC Truck's new suspension systems for 1960



By Glen Ramsey

Vice President, General Manager, Rectifier-Capacitor Division
Fansteel Metallurgical Corp.

THE author, Glen Ramsey, an electrical engineer from Lewis Institute, also attended the University of Chicago and Northwestern University. He has been with Fansteel Metallurgical Corp. since 1936, and is the developer of the porous tantalum electrode for electrolytic capacitors. Ramsey is a member of National Defense Executive Reserve; Association of American Railroads; American Institute of Electrical Engineers and the Society of Automotive Engineers; and has authored numerous engineering articles.

Silicon Rectifiers for A-C Generating Systems

THE alternator/rectifier electrical system, also known as the a-c generating system, is now ready for introduction as standard equipment in mass produced passenger automobiles. Now, because of a new silicon rectifier, it will be practical to apply to pleasure vehicles a concept of generating power that has proved itself in commercial vehicles over millions of miles.

Since shortly after the end of World War II, alternator/rectifier systems have been used in virtually all heavy trucks, buses, police cars, taxis and other vehicles requiring electrical equipment or accessories demanding more power than standard or heavy d-c generators could deliver. These systems use an alternator for producing a-c, a selenium rectifier that converts the alternator's output to d-c, and the conventional voltage regulator for controlling field current, cut-in and cut-out.

Work on the new system had

been going on since the early 1930's, in the laboratories of Chrysler Corp. and firms like Leece-Neville Co. (which has been marketing the present system in volume since 1946). The development of the selenium, and now the silicon, rectifiers was handled by Fansteel Metallurgical Corp.

The alternator/selenium rectifier system is doing an excellent job in the special-duty vehicles mentioned. But certain physical limitations and the production problems created by the shortage of selenium itself have prevented industry-wide application of the system to passenger cars.

Silicon now solves these problems. Like selenium, it is a semiconductor—it will allow electrical current to pass through one way but not the other. This material is unusually well qualified for automotive rectifier service. Unlimited quantities of silicon are always available and production costs are

low. In addition, it has great stability and very long in-use life. Silicon diodes in small packages will accommodate exceptionally heavy current. Diodes are made so small, in fact, that the entire rectifying unit will be enclosed in the alternator housing.

High temperature resistance, another of silicon's outstanding qualities, eliminates the need for special cooling arrangements and permits the silicon rectifier to be mounted as an integral part of the alternator (Fig. 1).

Silicon rectifiers in an alternator system will turn in better performance, too, especially at low speeds. An alternator system with silicon rectifier will actually operate at as much as 60 per cent capacity at the slowest possible engine idling speed. Note, in Table I, the relative outputs of alternator system with silicon rectifier, and the standard d-c generating system.

Our present d-c automotive elec-

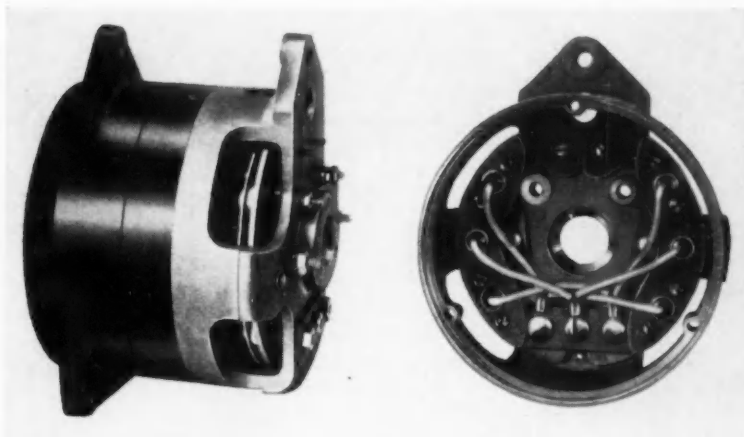


Fig. 1—Typical alternator rectifier unit showing silicon rectifiers mounted inside alternator housing

TABLE I
OUTPUT AT VEHICLE MPH

Vehicle Speed	Alternator System with Silicon Rectifier	D-C Generator
5 mph (idling speed)	20 amps	0 amps
10 mph	35 amps	0 amps
15 mph	40 amps	28 amps
20 mph	50 amps	40 amps
25 mph	50 amps	40 amps
30 mph	50 amps	40 amps

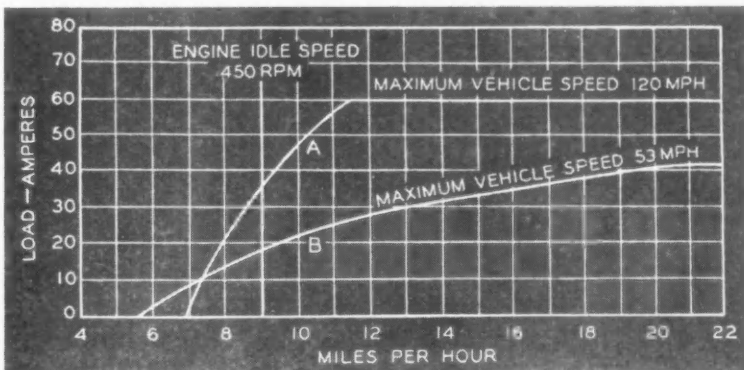


Fig. 2—Comparison of d-c generator and alternator-rectifier system performance

trical system is just about taxed to the limit with electrical equipment and accessories. It is obvious that not too many of the power-sapping devices need to operate at once to force the battery to cut into the system. This, particularly at idling speeds or in slow city traffic, causes short battery life as well as frequent run-downs. Fig. 2 compares performance of a d-c generator, heavy service type as formerly used in police cars, and an alternator system with selenium rectifier. Note that the d-c system cuts in at slightly lower speed, but that the alternator/rectifier system shows greater output over a much wider speed range. The pulley ratio of the d-c generator which provides low cut-in also limits the vehicle speed to 53 miles per hour. This is because mechanical limitations will not permit stepping up slow-speed output with higher pulley ratios. Silicon rectifiers will improve alternator performance even more.

For another illustration of d-c and alternator/rectifier characteristics, compare a 14-volt, 50-ampere d-c truck generator with a 14-volt, 60-ampere selenium-rectified a-c system. Fig. 3 shows the conventional 2-pole d-c generator, 5 $\frac{3}{8}$ in. diameter, 13 $\frac{5}{16}$ in. long. Fig. 4 shows an alternator of the type used in trucks and buses. This one is 6 $\frac{5}{8}$ in. diameter by 9 $\frac{1}{8}$ in. long, a 3-phase, Y-connected, variable frequency, 12-pole alternator. Its separate full-wave bridge type selenium rectifier is shown in Fig. 5.

The d-c generator, through its 3-element voltage regulator, balances 14 volts no load at 1250 rpm., half load at 1515 rpm. and full load at 1900 rpm. Its maximum speed under 50-ampere load is 8000 rpm.

The alternator and rectifier, also controlled by a 3-element regulator, balances 14 volts no load at 900 rpm., 14 volts half load at 1080 rpm. and full load at 1300 rpm.

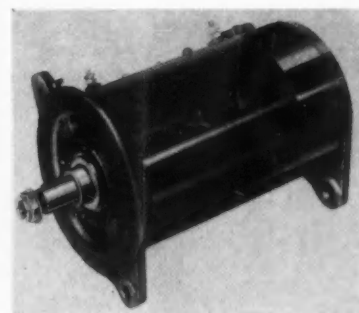


Fig. 3—Conventional d-c generator

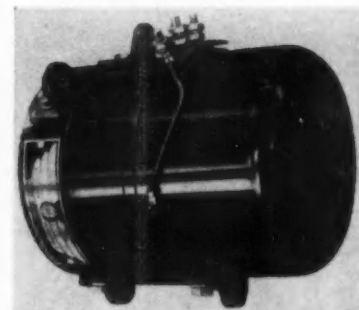


Fig. 4—Three-phase, Y-connected, variable frequency 12-pole alternator

Maximum speed of the machine is limited only by its bearings at about 12000 rpm.

The performance curves for these two systems are given in Fig. 6.

The alternator has no commutator, no rotating armature, no heavy current-carrying brushes to arc at high speeds. It is basically an "inside-out" generator with heavy a-c produced in the stationary wind-

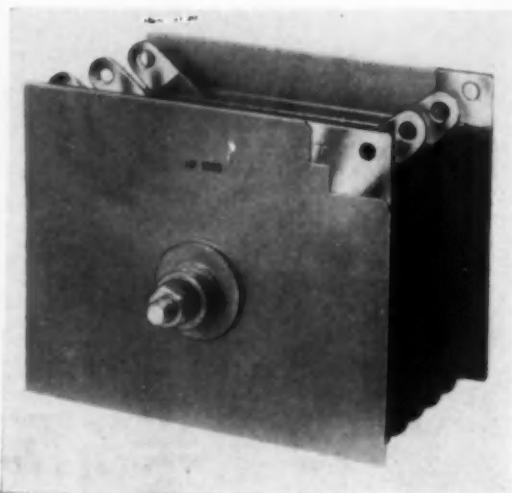


Fig. 5—Selenium rectifier stack of type used with alternator shown in Fig. 4

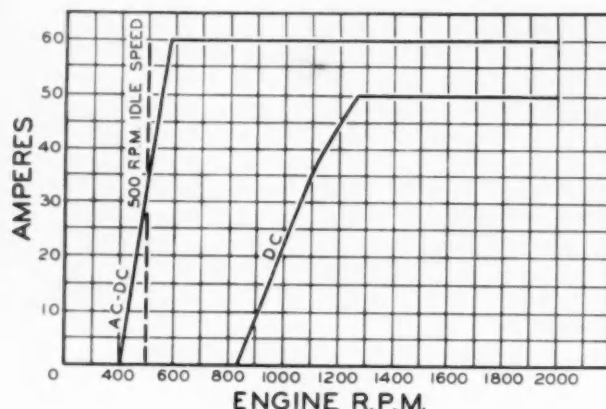


Fig. 6—Performance curves of the alternator-rectifier system and the d-c generator system

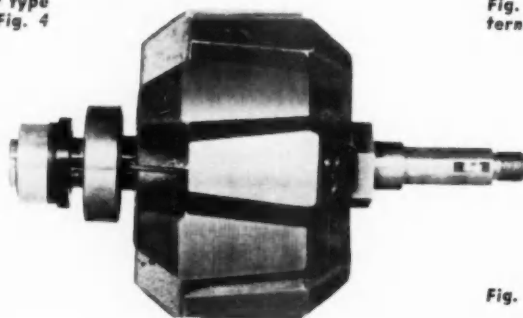


Fig. 7—Alternator rotor consisting of two six-legged forgings

ings and the rotating field excited through small brushes riding on smooth slip rings, carrying about 2 amperes (Fig. 7). Therefore, the alternator is limited only by the maximum permissible speed of its bearings, not by a commutation system.

In addition to being a more efficient generating system with greater output, the alternator/rectifier system will be constructed as a lighter-weight unit than the d-c generator and will be considerably less troublesome.

Another step in providing longer, more trouble-free service is in the use of transistorized voltage regulators. One type employs a transistor with conventional vibrating points to control entire field current with less than one ampere at the points (see diagram, Fig. 8). W. C. Edmundson of Delco-Remy,

in his paper, "Trends in Truck and Bus Electrical Equipment," presented at the 1959 SAE Summer Meeting, discusses a full transistor regulator that eliminates all moving parts. In it a Zener diode is used as the voltage sensing device. This device starts to pass current at the same potential each time the voltage rises to this potential, shutting off the field current through the transistor circuits (Fig. 9) until the voltage falls below this potential. A field discharge diode is used to short circuit the inductive energy of the field when the circuit is interrupted.

It is readily apparent that, to meet new passenger car electrical power demands at all speed ranges, the alternator/rectifier system is the best solution. Furthermore, incorporating the silicon rectifier into the alternator housing makes it

possible for the system to take up no more—and possibly less—physical space in the engine compartment than the conventional d-c system. Yet, output will be decidedly improved.

The silicon rectifier assembly will consist of six miniature diodes—three positive, three negative. Latest production units are so designed as to fit any one of many different alternator assemblies. The diodes are silicon diffused-junction types. Each is encased in aluminum and held fast by a curl type seal to insure good electrical and thermal contact with the case itself (Fig. 10). Aluminum is the ideal diode housing material because it is a good heat sink, is easily fabricated and is compatible with aluminum alternator housings.

My own company shares the industry feeling that, by 1961, nearly

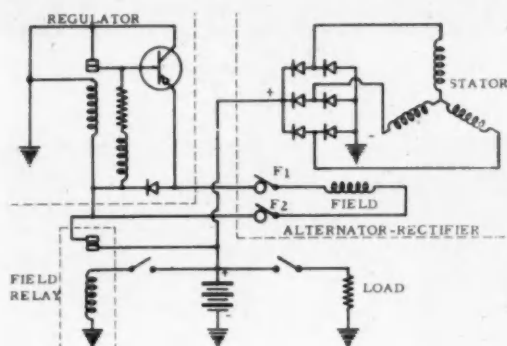


Fig. 8—Transistorized control of field current

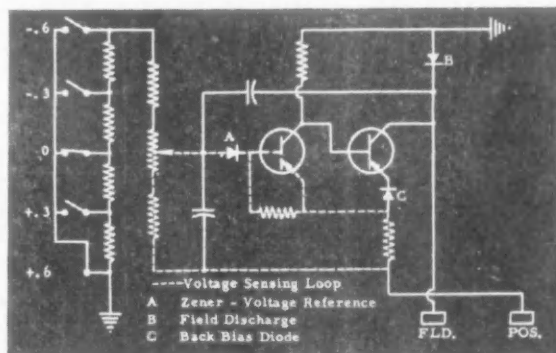
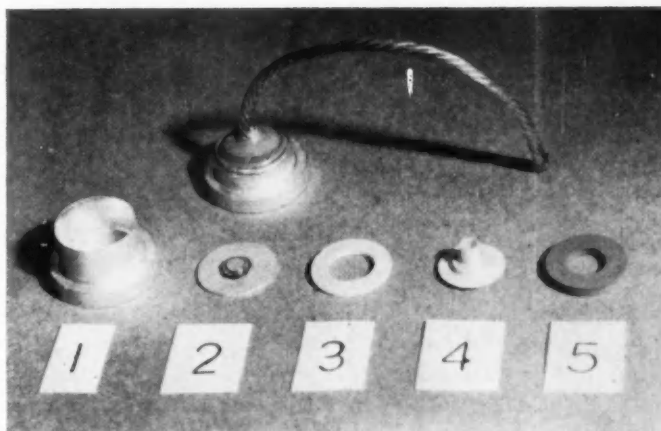


Fig. 9—Full transistor voltage control

Fig. 10—Silicon rectifier diode of type manufactured by Fansteel Metallurgical Corp. (1) Aluminum housing. (2) Silicon rectifier element. (3) Spacing washer. (4) Contact electrode. (5) Seal washer.



all automobiles made for passenger use will generate their electrical power with alternators and silicon rectifiers. Fansteel has enough confidence in the system to have begun construction of new plant facilities strictly for producing silicon rectifiers—more than 50,000 each day, 30,000 of which will be tagged for automotive application. This production will approach 15 per cent to 20 per cent of the estimated industry requirements, but plans for expanded facilities are ready to be put into effect as soon as new demands require them. ■

Illustrations in Figures 8 and 9 courtesy of W. C. Edmundson, Delco-Remy Div., General Motors Corp., and Figures 2 and 6 courtesy of A. D. Gilchrist, The Leece-Neville Co.

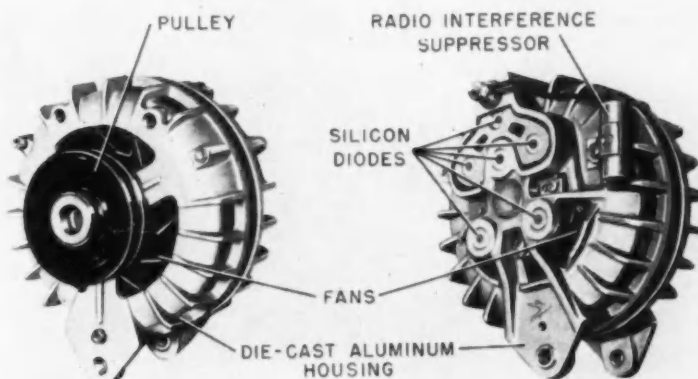


FIG. 11—Alternator on the new Chrysler-built Valiant. The unit weighs about 12 lb. No current regulator is needed with the alternator, since it is self-regulating. Because the diodes prevent reverse current flow, there is no need for a cut-out. The only external component is a small voltage regulator mounted on the radiator yoke ahead of the battery.

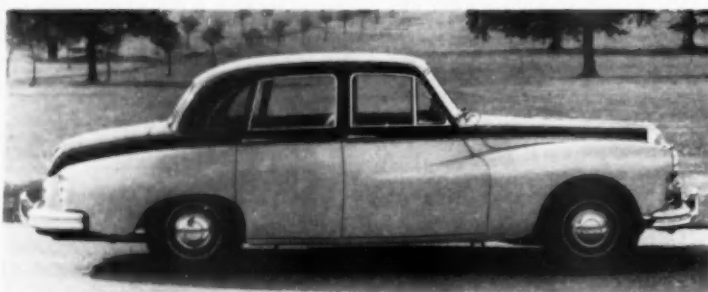
London Motor Show Winds Up Boom Year

By David Scott

Special European Correspondent
for AUTOMOTIVE INDUSTRIES



Britain's costliest sports car, the latest Bentley Continental uses the Rolls-Royce 380-cu in. V-8 engine



New Daimler V-8 engine of 278.2-cu in. displacement powers the Majestic Major



The B.M.C. Princess uses many chassis and body components common to the larger Austin and Wolseley cars

THE London Motor Show in October wound up the most successful year in the history of the British automobile industry. Production is at an all-time high, and is currently running at an annual rate of some 1.1 million cars. Exports, accounting for over half the output, also are at a record level.

Shipments to the United States, Britain's No. 1 market, are well up on 1958, and are expected to reach nearly a quarter-million this year. Sales to Canada are two-thirds higher, and may top 70,000 in 1959.

The past 12 months have also been a vintage year for the British industry, when most of the manufacturers have not only brought out new models and in some cases complete lines, but have introduced genuine technical advances in contrast to the sporadic face-lifts of the past.

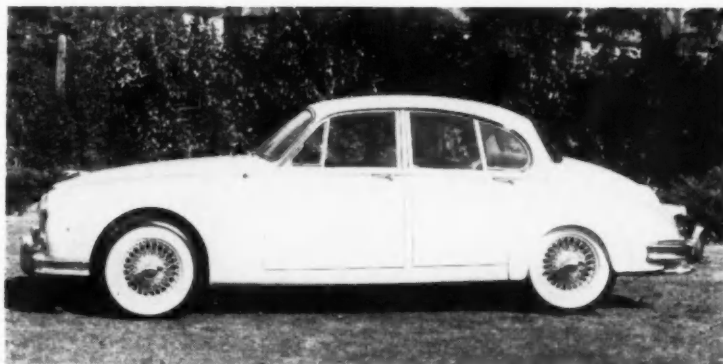
The Triumph Herald broke with English tradition in having all-independent suspension with swing axles at the rear, and a chassis requiring no periodic lubrication. While basically conventional, the latest Ford Anglia is powered by an engine having the highest bore/stroke ratio of any ever mass-produced.

The British Motor Corp.'s baby Morris and Austin models feature front-drive with a cross-mounted engine that uses the underslung gearbox as an oil sump, and a unique form of rubber suspension on all wheels. During this period, too, B. M. C. has made a fresh start with virtually its entire range, adapting its Italian-styled Farina bodies to its 1½- and 3-liter cars to create a large family of new models.

for British Automobile Industry



Grand Touring version of the Aston Martin DB4 has cowed headlamps, and a shorter wheelbase and overall length than the basic sports model



Jaguar Mark 2 features slim roof and door pillars, providing a larger glass area

It has thus kept alive the traditional names of Austin, Morris, Wolseley, Riley and M. G. (as well as preserving its rewarding multiple distribution channels), while effecting the largest-scale rationalization of design and production ever attempted.

With the Smiths "Easidrive" for the Hillman Minx, Rootes is offer-

ing the first fully-automatic transmission available for a medium-powered car in the popular price range. Rolls-Royce and Daimler have brought out the first V-8 engines to be made in Britain for several years, and disk brakes have been adopted as standard equipment on a considerable number of the larger volume-produced cars.

In fact, the British industry can now boast a wider variety of technically different cars than any other manufacturing country, as well as producing the largest number of different makes that formerly were mechanically similar and lacked original thinking.

These developments contributed to making this year's show at Earls Court the most interesting and important one ever held. Altogether some 350 cars were displayed by 61 companies, of which 33 were British and the remainder from all the major manufacturers of Europe and America.

Adding interest to the London show was the initial appearance in Britain of the Chevrolet Corvair and Ford Falcon, and especially the fact that Chrysler selected it for the world premiere of the Valiant. At the other extreme, Russia's Volga and Moskvitch made their debut in the U. K.

While most of the new British models have been introduced during the past year (and have already been described in AI), several of the smaller or specialist producers made their disclosures just prior to or at the opening of the show. Daimler presented a new 278.2-cu in. V-8 engine for its Majestic Major sedan, which is an enlarged version of the 90-deg 152.5-cu in. unit powering the Dart sports car. See AI, October 15, page 81.

Developing 220 hp at 5500 rpm, it is oversquare with a 3.75-in. bore

(Turn to page 132, please)



Armstrong Siddeley Star Sapphire limousine on a 135-in. wheelbase has disk front brakes and power steering

Motor Vehicle Registrations Well Above Figure for 1958

By Marcus Ainsworth
STATISTICAL EDITOR

MOTOR vehicle registrations during 1959 are expected to reach 70,097,473, a 3.3

per cent increase over the registrations of 1958.

This estimate is based on an an-

nual survey conducted by AUTOMOTIVE INDUSTRIES, the results of which in past years have proved to be within less than 0.1 per cent from final registrations. This extremely close estimate can be attributed to the fine cooperation of the motor vehicle commissioners of the various states. They furnish us with their actual registrations through either August or September and in addition give us their estimate for the remaining period of their registration year. Forty

(Turn to page 88, please)

Forecast of 1959 Motor Vehicle Registrations

As of the end of the Registration Year

These data do not include publicly owned vehicles of which there were approximately 877,000 cars in 1958

State	Passenger Cars		Per Cent Change	Trucks and Buses		Per Cent Change	Total Motor Vehicles		Per Cent Change
	1958	1959		1958	1959		1958	1959	
Alabama	308,100	327,310	+ 5.5	205,420	206,200	+ 0.4	1,145,000	1,037,500	+ 8.3
Alaska	50,700	49,800	+ 1.8	15,000	17,212	+ 8.1	89,300	67,007	+ 3.3
Arizona	430,200	466,400	+ 8.1	114,700	108,821	+ 7.7	544,900	575,219	+ 5.4
Arkansas	480,700	447,434	+ 4.3	185,000	185,801	+ 0.4	665,700	633,235	+ 4.0
California	6,323,000	6,230,700	+ 1.5	925,000	927,400	+ 0.3	7,248,000	7,158,100	+ 1.2
Colorado	690,000	691,000	+ 0.1	105,000	103,283	+ 2.0	795,000	794,283	+ 0.0
Connecticut	920,000	900,704	+ 1.2	115,000	114,025	+ 1.0	1,035,000	1,014,729	+ 1.2
Delaware	137,300	132,003	+ 3.9	40,000	42,262	+ 5.6	177,300	174,265	+ 4.3
District of Columbia	177,000	174,277	+ 1.5	30,000	19,825	+ 0.0	207,000	194,102	+ 1.0
Florida	1,910,000	1,706,577	+ 8.0	297,000	273,125	+ 8.1	2,207,000	1,979,702	+ 8.2
Georgia	1,100,000	1,078,049	+ 2.2	285,000	254,839	+ 1.3	1,385,000	1,332,888	+ 2.0
Idaho	240,000	240,000	+ 2.1	95,000	92,600	+ 6.7	335,000	332,600	+ 3.1
Illinois	3,200,000	3,121,241	+ 2.7	445,000	430,270	+ 3.0	3,645,000	3,551,511	+ 2.6
Indiana	1,010,000	1,000,713	+ 2.0	330,000	330,232	+ 2.3	1,340,000	1,330,945	+ 2.0
Iowa	1,043,000	1,061,439	+ 4.2	233,000	222,000	+ 4.7	1,276,000	1,283,439	+ 2.0
Kansas	654,000	639,902	+ 1.0	270,000	263,070	+ 9.0	1,124,000	1,062,972	+ 3.4
Kentucky	900,000	867,167	+ 2.0	234,000	226,436	+ 4.2	1,134,000	1,093,603	+ 2.0
Louisiana	913,000	872,300	+ 4.0	210,000	213,200	+ 2.7	1,123,000	1,085,500	+ 4.2
Maine	287,000	283,140	+ 1.6	71,000	70,000	+ 1.1	358,000	353,140	+ 1.0
Maryland	950,100	950,000	+ 4.6	142,000	130,000	+ 2.1	1,092,100	1,080,000	+ 4.3
Massachusetts	1,540,000	1,497,002	+ 2.0	104,000	101,000	+ 1.8	1,644,000	1,598,002	+ 2.7
Michigan	2,707,000	2,606,514	+ 2.5	280,000	281,230	+ 9.7	2,987,000	2,887,744	+ 2.6
Minnesota	1,340,000	1,254,823	+ 2.0	200,000	204,200	+ 2.0	1,540,000	1,459,023	+ 2.0
Mississippi	820,000	406,002	+12.0	100,000	175,821	+ 7.2	920,000	581,823	+11.1
Missouri	1,300,000	1,206,043	+ 4.0	323,000	310,272	+ 2.0	1,623,000	1,516,315	+ 3.7
Montana	354,000	344,770	+ 3.0	112,000	100,000	+ 4.0	466,000	444,770	+ 4.1
Nebraska	620,000	610,200	+ 0.7	162,000	161,787	+ 0.2	782,000	771,987	+ 0.6
Nevada	110,000	100,700	+ 5.3	32,000	31,204	+ 9.0	142,000	131,904	+ 5.0
New Hampshire	100,000	101,000	+ 3.0	41,000	40,410	+ 1.4	141,000	141,410	+ 3.0
New Jersey	2,000,000	1,944,000	+ 2.0	200,000	202,400	+ 1.4	2,200,000	2,146,400	+ 2.7
New Mexico	204,000	207,000	+ 0.0	100,000	90,467	+ 4.0	304,000	297,467	+ 0.6
New York	4,440,000	4,343,501	+ 2.2	520,000	510,000	+ 1.0	4,960,000	4,853,501	+ 2.2
North Carolina	1,310,000	1,225,000	+ 0.6	207,000	202,200	+ 0.3	1,517,000	1,427,200	+ 0.6
North Dakota	200,000	210,000	+ 1.0	100,000	102,000	+ 0.0	300,000	312,000	+ 2.0
Ohio	5,470,000	5,300,301	+ 2.0	422,000	413,001	+ 2.0	5,892,000	5,713,302	+ 2.0
Oklahoma	842,000	813,442	+ 3.5	274,000	259,040	+ 0.6	1,116,000	1,072,482	+ 4.0
Oregon	770,000	790,700	+ 2.7	60,000	70,207	+ 1.0	830,000	860,907	+ 2.3
Pennsylvania	3,003,000	3,007,300	+ 3.3	600,000	570,000	+ 0.7	3,603,000	3,577,300	+ 3.7
Rhode Island	282,100	283,113	+ 0.2	35,000	35,173	+ 0.0	317,100	318,286	+ 0.0
South Carolina	670,000	640,832	+ 5.4	162,000	140,830	+10.2	832,000	781,662	+ 7.2
South Dakota	300,000	344,004	+ 2.0	60,000	67,000	+ 1.0	360,000	411,004	+ 2.0
Tennessee	1,004,000	1,012,000	+ 4.1	217,000	210,007	+ 0.7	1,221,000	1,222,007	+ 0.0
Texas	3,440,000	3,291,007	+ 4.0	670,000	610,071	+ 0.3	4,110,000	3,901,078	+ 4.0
Utah	310,000	300,404	+ 3.2	70,000	72,407	+ 0.7	380,000	372,811	+ 0.6
Vermont	132,000	120,100	+ 2.0	14,000	14,110	+ 0.8	146,000	136,210	+ 2.2
Virginia	1,157,000	1,130,000	+ 1.0	230,000	222,404	+ 3.2	1,387,000	1,352,404	+ 2.1
Washington	1,073,300	1,040,000	+ 3.2	230,000	223,230	+ 3.1	1,303,300	1,263,230	+ 3.2
West Virginia	400,223	400,204	+ 3.2	130,000	120,077	+10.0	530,223	520,281	+ 4.0
Wisconsin	1,270,000	1,340,000	+ 2.1	200,700	207,000	+ 1.3	1,470,700	1,547,000	+ 2.0
Wyoming	130,000	124,000	+ 4.1	60,000	60,200	+ 0.3	190,000	184,200	+ 3.0
Total	60,000,000	67,072,533	+ 3.2	11,100,041	10,700,400	+ 3.7	71,100,041	77,772,933	+ 3.3

Body Engineers Hold 14th Annual Convention

TECHNICAL papers slanted at the "Coming Decade of Body Design" as well as some 35 exhibits of products and materials specifically of interest to body engineers were highlights of the 14th Annual Convention of the American Society of Body Engineers (ASBE) held in Detroit in October. Fastenings—Palmat, United Carr, Press-tite, Tinnerman; plastics, rubber, mechanism and components were well represented. Included too were exhibits of metal producers—Reynolds, Alcoa, and the Committee on Stainless Steel Producers.

Stainless Steel

Stainless steel applications were promoted by the exhibit as well as the presentation of a paper by Charles A. Hornell, Jr., Allegheny Ludlum Steel Corp. Future applications of interest to body engineers included: use of stainless steel for the fabrication of an advanced type of radiant heater for cars; stainless for making thinner but stronger corner posts; an interesting integral sill-rocker panel. On display was a cutaway experimental muffler, fabricated of stainless steel, which had been used for two years

By Joseph Geschelin

DETROIT EDITOR

on the road. Net result of this experiment was a decision to redesign the muffler in much lighter gages than for steel without impairing longevity.

One of the latest developments in stainless steel is a new type of surface finish that makes it possible to employ coated and textured sheets that show outstanding abrasion resistance, adhesion, and color retention on outdoor exposure.

The Anderson Company displayed its unique "Yo-Yo" transmission for use with electric windshield wipers. This employs a segmented pulley, wrapped with a cable attached to one point on its periphery. The two ends of the cable are fixed to a reciprocating link which acts as the driver. "Yo-Yo" is said to impart a smooth, simple harmonic motion to the wiper blades.

Plastic Planking

Ren Plastics, Inc., whose pioneering work in Epoxy plastics is well known around Detroit, introduced

Ren Wood, a new plastic planking material having the appearance of mahogany. It is intended to replace lumber for the making of master models and patterns. It has high dimensional stability, no grain, and is said to be easily worked with conventional woodworking tools.

Small Cars

Small cars had their day at this meeting. Joseph Oros, Ford Motor Co., described the forward planning of the new styling concept which preceded the final design of the Falcon. This was followed by a paper describing the actual design of the unitized Falcon body by J. D. Freedman. He pointed out that stress analysis combined with adequate testing plays a vital role in designing a unitized structure. This is particularly true in the case of a small car of minimum weight since each part and its attachment must meet stringent weight and rigidity requirements.

Aluminum

According to Robert E. Conlee, Aluminum Company of America, aluminum trim tonnage for the 1959 model year is estimated at 55-million lb. In 1959 we saw the first use of roll-formed aluminum moldings as a fender decoration. He also touched on the fact that perhaps as many as four 1961 cars will feature aluminum bumpers. Moreover, the fabrication techniques developed for making bumpers may lead to a more serious consideration of aluminum wheel covers as well. More attention is being given to a

(Turn to page 100, please)

Exhibitors

Aero-Detroit, Inc.
Aluminum Company of America
Atwood Vacuum Machine Company
Burlington Mills Incorporated
Capitol Reproductions Inc.
Committee of Stainless Steel Producers,
American Iron & Steel Institute
Creative Industries of Detroit
Dryden Rubber Div.,
Sheller Manufacturing Corp.
E. I. du Pont de Nemours & Company
Inc.
Enjay Company, Inc.
Fastex Division of Illinois Tool Works

Johns-Manville Sales Corp.
Keuffel & Esser Company of New York
Libbey-Owens-Ford Glass Company
Molded Fiber Glass Body Company
Northern Engraving & Manufacturing
Company
Owens-Corning Fiberglass Corp.
Pittsburgh Plate Glass Company
Presstite Div., American-Marietta Co.
Ren Plastics, Inc.
Reynolds Metals Company
Robin Products Company
Roton Div., The Anderson Company

Rubatex Div., Great American
Industries, Inc.
Soss Manufacturing Company
Stubnitz Greene Corp.
The Anderson Company
The Cuyahoga Products Corporation
The Palmat Company
The Standard Products Company
Tinnerman Products, Inc.
United Carr Fastener Corp.
Wettlaufer Engineering Div.,
Pioneer Engineering & Mfg. Company
Woodall Industries, Inc.
Wood Conversion Company

Automotive Developments Linked to Standards at ASA Conference

By Andrew W. Shearer

MARKET RESEARCH EDITOR



William L. Barth, winner of the ASA Standards Metal for service to the voluntary standards movement through leadership in the actual development of standards. Mr. Barth, retired, was formerly head of the Engineering Standards Section of General Motors Corp.

STANDARDS in automotive manufacturing, fasteners, tooling, material handling, space technology, and the relative merits of the English and metric systems for U. S. industry were among the subjects discussed at the recent Tenth National Conference on Standards. Detroit was chosen as the site for the three-day meeting (Oct. 20-22) in recognition of the vital function of standardization in the automotive industry.

A highlight of the conference, sponsored by the American Standards Association, was an address by Major General J. B. Medaris, retiring Commanding General of the Army Ordnance Missile Command, Huntsville, Ala. He spoke on "Standards for Survival" at the annual Awards Dinner of ASA. This occasion was also marked by the presentation of two

medals for outstanding service in the voluntary standards movement. The Howard Coonley Medal was awarded to Vincent DePaul Goubeau, vice-president, Radio Corp. of America, and the Standards Medal was presented to William L. Barth, retired head of the Engineering Standards Section of General Motors.

Taking as its theme "Standardization—Keystone of Industrial Progress," this year's national conference on standards was comprised of eight sessions. Sponsors included the: Automobile Manufacturers Association; American Society of Tool Engineers; Industrial Fasteners Institute; American Society of Mechanical Engineers; National Association of Purchasing Agents; and ASA's Company Member Conference and Standards Council. The following are extracts of selected papers presented at the conference.

Standardization—Keystone of Industrial Progress

By R. H. Isbrandt

Director of Automotive Engineering and Research
AMERICAN MOTORS CORP.

And Chairman, SAE Technical Board

WITHOUT standards we would have no interchangeable parts. Without interchangeable parts, we would have no assembly line. And without the assembly line, we could not have built and sold the millions of automobiles that have made America a nation on wheels.

Through the development and utilization of realistic standards, Ameri-

can manufacturers, including the automotive industry, have been able to provide many benefits to American consumers. These benefits include lower costs, better reliability, greater safety, and easier maintenance.

Standardization is the keystone of it all. The automotive pioneers built an industry around standards, and it was not long before many other in-

dustries adopted the techniques made possible by standardization. Standards represent the keystone that supports our modern mass-production economy.

The Unified Screw Thread, on which so many engineers have worked for almost 50 years, only recently became a practical reality. It is a big step forward, a showpiece of the progress possible through standardization.

The Unified Screw Thread was followed by another urgently needed set of standards. I refer to the American Standard Drafting Manual, which has its counterpart in the SAE Drafting Manual.

ASA and SAE have had a long



Pictured at the opening session of the 10th National Conference on Standards are (left to right): Dr. George H. Brown, vice-president of Engineering, Radio Corp. of America; Roy P. Trowbridge, Director of GM Engineering Standards Section, General Motors Corp.; and Louis C. Miriani, Mayor of Detroit. They are shown examining a demonstration of interference fringes from a Krypton 86 lamp (proposed for international standard of length) and a mercury 198 lamp developed by the National Bureau of Standards as a convenient working standard.

pleasant association in the development of standards. SAE standards apply to the automotive industry, while as already indicated, American Standards have a much wider application. There are, of course, many instances of overlapping and interchange, besides the fine pitch (SAE) screw thread system. For example, safety glass standards for cars were originally an SAE project, but in 1934 was taken over by ASA.

When properly designed and applied, standards can reduce costs of manufacture, facilitate assembly,

make for easier service, and definitely increase the overall utility to the customer. However, when improperly conceived or executed, or both, standards can also freeze designs, retard engineering progress, and fail to meet the changing needs of the customer.

Different degrees of flexibility may be needed to prevent stagnation of industrial progress. Standards must be reviewed periodically by competent authorities and technicians and either revised and updated to the changing conditions, or reaffirmed.

Philosophy Conflict of Tool Standardization

Tool standardization is concerned with the development of standards relating to dimensional specifications, performance, tests, nomenclature, definitions, etc., for machine tools, tool holders, tools, work holders, and inspection devices. Several important tool standardization projects are presently under intensive study

By Bernard Better
Research Director
SCULLY-JONES CO.

by various chapter committees of the American Society of Tool Engineers. An example of a tool standard that



Maj. Gen. John B. Medaris, Commanding General, U.S. Army Ordnance Missile Command, Huntsville, Ala., keynote speaker at the Annual ASA Award Dinner. Maj. Gen. Medaris spoke on "Standards for Survival." Theme of Conference: "Standardization — Keystone of Industrial Progress."

certainly was and still is needed, and one which has existed for many years, is the one covering spindle noses for boring mills, radial boring mills, etc. Each manufacturer has a slightly different arrangement for the location, width, and lengths of the drive lugs and the keeper keys. These slight differences make it almost impossible to interchange tools fitting one make of boring mill with those of another make.

Another example of a tool standard, this time a very successful one, is the one on non-sticking milling machine taper spindles and arbors. Before the adoption of this now almost universally used standard, there existed a very confusing number of ways of attaching and driving the tools used on milling machines.

Another case study of a good standard is the American Standard on adjustable adapters and multi-spindles. These are extensively used to hold, drive, and position various cutting tools, such as drills, reamers, taps, etc. Since the basic design principles of these tools have been stabilized, and sizes and ranges have followed a distinct pattern for many years, suppliers and users have been very cooperative and unselfish in creating and maintaining a "live" and-up-to-date tool standard. There are already efforts again at work to extend downward the size range of this standard to meet new needs.

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Designers at work on mockup for a new five-passenger sedan

CHINA'S Expanding Motor Vehicle Industry

By Robert Westgate

IN 1957 China's motor vehicle industry produced only one type motor vehicle—the "Liberation" truck, the original product of the Changchun plant. Since that time more than 100 types of cars and trucks, and more than 200 kinds of tractors have been made. Most of the vehicles are designed to suit specific conditions in various areas, and use gasoline, Diesel fuel, electricity, steam, coal, charcoal or LPG.

The exceptionally rapid growth of China's automobile and tractor industries has stemmed from a policy of simultaneously developing big, small and medium-sized enterprises. Most of the new cars have been turned out by factories which previously did only repair work. Some of them are now being reorganized or reconstructed as manufacturing plants. Workers at these plants have had years of experience in repairing cars which China formerly imported from practically all the major car-producing countries.

Most of the plants are medium and small factories but a number have been selected for expansion and development into regular motor and tractor works to go into mass production. They will work with big modern plants (notably the Changchun car plant and the Loyang tractor plant) to form a basis for

China's future large-scale car and tractor industry.

Best known product of China's Changchun works is the "Liberation" truck, a six-wheeler with a load carrying capacity of four tons. It has a six-cylinder gasoline engine that develops 90 hp. In the latter part of last year the Changchun plant brought out a new type of truck which is half a ton lighter than the "Liberation" and can carry one ton more.

The Chinese now are producing tractors ranging from 1.5 to 80 hp. They are adapted for use in paddy fields or on dry land, hilly and flat country, and on large areas or tiny plots. They include wheel-type, track-type, universal purpose and miniature tractors. With the exception of the "Loyang" model, 16 hp wheel-type, and "East Red," 45 hp track-type made by the large modern tractor plant in the city of Loyang in Honan Province, and the "Iron Bull 240," 40 hp Diesel engine, wheel-type made by the Tientsin Tractor Works, Hopei Province; they are all produced in widely scattered local factories working individually or in coordination. Some of these are:—"Sungari

Four-ton "Liberation" trucks coming off the assembly line at the Changchun plant.



China's widespread coal resources make vehicles such as this coal-burning truck suitable for many rural districts





Jeep-type vehicles built in a Shanghai plant



All-purpose 26-hp vehicle designed for agricultural use. It is made by the Shenyang Motor Car Assembly Plant in Northeast China

4," 35 hp Diesel engine, wheel-type, Kiamusze, Heilungkiang; "August 1," 26 hp Diesel engine, wheel-type, Nanchang, Kiangsi Province; "Chengtuo Associated," 26 hp Diesel engine, wheel-type, Chengtu, Szechwan Province; "Kanching 25," 25 hp Diesel engine, wheel-type, Nanking, Kiangsu Province; "Sungari 3," 25 hp Diesel engine, track-type, Harbin, Heilungkiang Province.

One of the heaviest type now produced in China is "Red Flag," an 80 hp track-type turned out by a farm tool plant in Liaoning Province. A 26 hp three-wheeler with a combined loading and towing capacity of over two tons and a maximum speed of about 17 mph is another recent product of the Chinese industry. It is made in Shenyang. A 30 hp three-wheeler, said to be capable of carrying a ton of freight, is being turned out through the combined efforts of about 30 small Shanghai factories.

By the end of this year the Chinese capital, Peking, will be an important vehicle manufacturing center. An automobile plant is being built by expanding a parts plant and when the expansion work is completed this year, the factory will have a yearly capacity of 50,000 vehicles. Expansion of two farm machinery plants in the city, to become tractor plants, also will be completed this year.

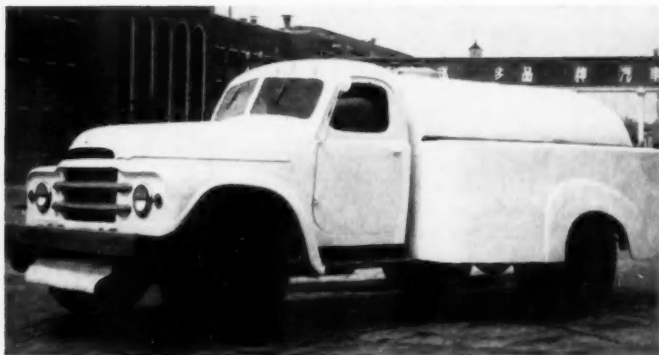


Three trucks produced at a parts manufacturing plant in Nanking

A tractor plant with an annual output of 5000 tractors and a motor vehicle plant with an annual output of 5000 light trucks in Hefei, capital of Anhwei Province, will be in production by 1960.

China now supplies between 80 and 90 per cent of the metal used in the automobile industry. When the Changchun plant started production in 1956, 80 per cent of the metal used was imported. ■

This 3½ ton water-sprinkling cart was designed and produced at the Changchun plant.



Multi-purpose cross-country truck is one of the latest of China's commercial vehicles



• • INDUSTRY STATISTICS • •

WEEKLY U. S. MOTOR VEHICLE PRODUCTION

As reported by the Automobile Manufacturers Association

Make	Weeks Ending		Year to Date	
	Oct. 31	Oct. 24	1959	1958
PASSENGER CAR PRODUCTION				
Total—American Motors Corp.	8,425	9,175	325,015	160,346
Chrysler	1,969	498	56,354	40,829
De Soto	915	181	37,328	29,674
Dodge	8,203	8,540	148,240	94,031
Imperial	564	568	17,612	9,925
Plymouth*	10,043	8,742	352,480	306,019
Total—Chrysler Corp.	21,714	16,549	614,022	480,478
Edsel	84	250	29,487	13,470
Ford*	33,619	31,332	1,264,411	769,255
Lincoln	821	874	23,092	19,489
Mercury	3,834	3,744	129,027	89,342
Total—Ford Motor Co.	38,458	36,200	1,446,017	891,556
Buick	5,570	6,783	206,325	175,330
Cadillac	2,658	3,372	126,651	94,280
Chevrolet*	7,715	19,641	1,300,139	931,434
Oldsmobile	7,642	8,685	337,120	227,995
Pontiac	6,144	8,929	360,153	151,116
Total—General Motors Corp.	29,729	47,410	2,330,388	1,580,155
Total—Studebaker-Packard Corp.	3,334	3,153	128,810	33,211
Checker Cab	188	174	3,679	2,395
Total—Passenger Cars	101,846	112,661	4,847,931	3,148,141
TRUCK AND BUS PRODUCTION				
Chevrolet	1,080	5,584	297,910	206,841
G. M. C.	1,074	1,028	70,276	47,323
Diamond T	61	83	4,787	4,756
Divee	80	80	3,156	2,422
Dodge and Fargo	1,761	1,775	65,920	45,402
Ford	8,723	6,506	285,123	168,023
F. W. D.	16	26	895	1,082
International	2,901	2,901	123,318	78,276
Mack	318	342	14,703	11,932
Studebaker	101	101	10,887	8,027
White	414	402	16,753	14,249
Willys	1,699	1,912	97,291	73,877
Other Trucks	60	60	3,123	2,593
Total—Trucks	16,189	20,800	997,139	680,803
Buses	65	90	2,013	2,666
Total—Motor Vehicles	118,012	113,551	5,847,083	3,831,610

* Plymouth includes Valiant; Ford the Falcon; and Chevrolet the Corvair.

1959 TRUCK TRAILER SHIPMENTS

Industry Division, Bureau of the Census

Type of Trailer	Eight Months		
	August	1959	1958
Vans			
Insulated and refrigerated	449	2,966	1,879
Steel	35	389	241
Aluminum	414	2,577	1,738
Semi-insulated	132	723	323
Steel	132	723	323
Aluminum	102	1,103	932
Furniture	88	915	932
Steel	14	188	188
Aluminum	2,363	18,807	8,963
All other closed top	638	5,233	2,986
Steel	1,725	13,574	5,977
Open-top	346	1,973	1,146
Steel	110	804	582
Aluminum	236	1,169	564
Total—Vans	3,392	25,572	13,343
Tanks			
Non- and low pressure			
Petroleum			
Carbon and alloy steel	189	1,610	1,301
Stainless steel	25	204	134
Aluminum	161	1,173	773
Total—Petroleum	375	2,987	2,208
Chemical, food, fluid solids	52	335	381
All other, incl. aircraft refuelers	122	1,167	489
High Pressure (LPG, chemicals, etc.)	26	231	201
Total—Tanks	575	4,720	3,279
Pole, pipe and logging			
Single axle	32	237	183
Tandem axle	92	796	333
Total	124	1,023	516
Platforms			
Racks, livestock and stake	40	342	1,037
Grain bodies, all types	92	1,174	543
Platforms (flats), all types	885	7,120	3,308
Total—Platform	1,017	8,636	4,888
Low-bed heavy haulers	154	1,763	1,361
Dump trailers	197	1,715	1,501
All other trailers	209	1,991	976
Total—Complete Trailers	5,688	45,420	25,064
Trailer chassis ¹	214	2,785	1,859
Total—Trailers and Chassis	5,882	48,185	27,723

¹ Sold separately.

NEW PASSENGER CAR REGISTRATIONS BY REGIONS

Zone	Region	August 1959	July 1959	August 1958	Eight Months		Per Cent Change		
					1959	1958	August over July	August over August 1958	Eight Months 1958 over 1959
1	New England	26,536	31,609	20,022	219,313	175,889	-16.05	+32.53	+24.69
2	Middle Atlantic	91,247	101,436	72,997	742,868	618,472	-10.04	+25.00	+20.11
3	South Atlantic	69,668	73,172	51,121	550,431	403,778	-4.79	+36.28	+36.32
4	East North Central	133,636	143,918	85,939	1,072,216	732,676	-7.14	+55.50	+46.34
5	East South Central	26,253	23,296	16,102	188,033	136,551	+12.69	+63.04	+37.70
6	West North Central	46,993	49,183	36,044	377,802	308,193	-4.44	+30.38	+22.59
7	West South Central	52,262	53,679	34,019	364,652	287,012	-2.60	+53.68	+27.05
8	Mountain	21,249	20,924	14,543	152,501	116,308	+1.55	+46.11	+31.12
9	Pacific	64,415	67,768	44,586	510,329	372,948	-4.95	+44.47	+36.84
Total—United States		532,279	564,985	375,373	4,178,145	3,151,826	-5.79	+41.80	+32.56

States comprising the various regions are: Zone 1—Conn., Me., Mass., N. H., R. I., Vt. Zone 2—N. J., N. Y., Pa. Zone 3—Del., D. C., Fla., Ga., Md., N. C., S. C., Va., W. Va. Zone 4—Ill., Ind., Mich., Ohio, Wis. Zone 5—Ala., Ky., Miss., Tenn. Zone 6—Iowa, Kan.,

Minn., Mo., Neb., N. D., S. D. Zone 7—Ark., La., Okla., Tex. Zone 8—Ariz., Colo., Ida., Mont., Nev., N. M., Utah, Wyo. Zone 9—Alas., Cal., Ore., Wash.

1959 TRUCK FACTORY SALES BY G.V.W.

As reported by the Automobile Manufacturers Association

	Period	6,000 lb. and less	6,001- 10,000 lb.	10,001- 14,000 lb.	14,001- 16,000 lb.	16,001- 19,500 lb.	19,501- 26,000 lb.	26,001- 33,000 lb.	33,000 lb. and over	Total
First Quarter		155,408	51,094	3,915	25,857	35,133	15,806	10,358	9,801	357,372
Second Quarter		178,239	54,788	4,576	32,002	43,676	18,150	11,513	11,508	381,448
Total—Six Months		333,647	105,882	8,491	57,859	78,809	33,956	21,871	21,308	658,821
July		56,411	15,893	1,757	10,943	14,011	6,801	3,517	3,354	114,687
August		28,160	7,966	340	2,857	10,465	4,713	2,970	2,656	60,147
September		45,747	10,768	736	2,737	6,550	4,179	3,763	3,073	78,573
Total—Third Quarter		132,318	34,647	2,833	16,537	33,026	15,693	10,270	9,063	254,407
Total—Nine Months—1959		462,965	140,529	11,324	74,396	111,835	49,649	32,141	30,389	913,228
Total—Nine Months—1958		297,540	89,584	9,886	61,077	70,345	38,541	22,498	21,471	610,922

Selected Data of 1960 Passenger Cars

Including Compact Cars and All Optional Engines

All dimensions, weights and prices apply to lowest priced four-door sedan or nearest equivalent model

MAKE AND MODEL		Wheelbase (In.)	OVERALL DIMENSIONS (In.)			Tire Size	ENGINE				Equipment Availability		Shipping Weight (Lb.)	Retail Price at Factory *	
			Length	Width	Height— (at curb weight)		Number of Cylinders, Bore and Stroke (In.)	Displacement (Cu. In.)	Compression Ratio—to 1	Max. Brake Hp. at Specified Rpm.	Automatic Transmission	Power Steering			
AMERICAN MOTORS CORP.															
Rambler	American 6-6001	100.0	178.3	73.0	5.90 15	6-3 1/2 x 4 1/4	195.6	8.0	90-3800	Opt	Opt	2494	1844		
	Six 6-6010	108.0	189.5	72.2	6.40 15	6-3 1/2 x 4 1/4	195.6	8.7	127-4200	Opt	Opt	2918	2098		
	Rebel 8-6020	108.0	189.5	72.2	7.50 14	8-3 1/2 x 3 1/4	290.0	8.7	200-4900	Opt	Opt	3282	2387		
	Ambassador 8-6080	117.0	198.5	72.2	8.00 14	8-4 x 3 1/4	327.0	8.7	290-4700	Opt	Opt	3414	2587		
CHRYSLER CORP.															
Chrysler	Windsor 8-PC1-L	122.0	215.4	79.4	56.7	8.00 14	8-4 1/2 x 3 3/4	383.0	10.0	305-4600	Std	Opt	3850	3288	
	Saratoga 8-PC2-M	126.0	219.4	79.4	57.1	8.50 14	8-4 1/2 x 3 3/4	383.0	10.0	325-4600	Std	Std	4010	3864	
	New Yorker 8-PC3-H	176.0	219.6	79.4	57.4	9.00 14	8-4 1/2 x 3 3/4	413.0	10.0	350-4600	Std	Std	4145	4334	
	8-300-F	126.0									Std	Std	5336		
De Soto	Fireflite 8-PS1-L	122.0	215.4	79.4		8.00 14	8-4 1/2 x 3 3/4	361.0	10.0	295-4600	Opt	Opt	3805	2967	
	Adventurer 8-PS3-M	122.0	215.4	79.4		8.00 14	8-4 1/2 x 3 3/4	383.0	10.0	305-4600	Std	Opt	3895	3529	
	8-PS1-L, PS3-M (Engine Option)	122.0	215.4	79.4		8.00 14	8-4 1/2 x 3 3/4	383.0	10.0	325-4600	Std	Opt			
	8-PS3-M (Engine Option)	122.0	215.4	79.4		8.00 14	8-4 1/2 x 3 3/4	383.0	10.0	330-4600	Std	Opt			
Dodge	Matador 8-PD1-L	122.0	212.6	78.0		8.00 14	8-4 1/2 x 3 3/4	381.0	10.0	295-4600	Opt		2672		
	Polaris 8-PD2-H	122.0	212.6	78.0		8.00 14	8-4 1/2 x 3 3/4	383.0	10.0	325-4600	Opt		2868		
	8-PD1-L, PD2-H (Engine Option)	122.0	212.6	78.0		8.00 14	8-4 1/2 x 3 3/4	383.0	10.0	330-4800	Std				
Dodge Dart	Seneca 6-PD3-L, Pioneer 8-PD3-M	118.0	208.6	78.0	56.7	7.50 14	6-3 1/2 x 4 1/4	225.0	8.5	145-4000	Opt	Opt	2124		
	Seneca 8-PD4-L, Pioneer 8-PD4-M	118.0	208.6	78.0	56.7	7.50 14	8-3 1/2 x 3 1/2	318.0	9.0	230-4400	Opt	Opt	2235		
	Phoenix 8-PD4-H	118.0	208.6	78.0	56.7	7.50 14	8-3 1/2 x 3 1/2	318.0	9.0	255-4400	Opt	Opt	2482		
	8-PD4-H (Engine Option)	118.0	208.6	78.0	56.7	8.00 14	8-4 1/2 x 3 3/4	383.0	10.0	310-4800	Std	Opt			
Imperial	Custom, Crown, LeBaron 8-PY1	129.0	226.3	80.1	58.4	8.20 15	8-4 1/2 x 3 3/4	413.0	10.1	350-4600	Std	Std	4700	4939	
Plymouth	Savoy, Belvedere, Fury 8-PP1	118.0	209.4	78.6	56.7	7.50 14	8-3 1/2 x 4 1/4	225.0	8.5	145-4000	Opt	Opt	3365	2275	
	Savoy, Belvedere, Fury 8-PP2	118.0	209.4	78.6	56.7	7.50 14	8-3 1/2 x 3 1/2	318.0	9.0	230-4400	Opt	Opt	3500	2395	
	8-PP2 (Engine Option)	118.0	209.4	78.6	56.7	7.50 14	8-3 1/2 x 3 1/2	318.0	9.0	260-4400	Opt	Opt			
	8-PP2 (Engine Option)	118.0	209.4	78.6	56.7	7.50 14	8-4 1/2 x 3 3/4	361.0	10.0	305-4800	Opt	Opt			
	8-PP2 (Engine Option)	118.0	209.4	78.6	56.7	7.50 14	8-4 1/2 x 3 3/4	361.0	10.0	310-4800	Std	Opt			
Valiant	6-V100, V200	106.5	184.0	70.4	6.50	13	6-3 1/2 x 3 1/2	170.0	8.6	101-4400	Opt	Opt	2836		
FORD MOTOR CO.															
Edsel	Ranger 6	120.0	216.4	81.5	56.8	7.50 14	6-3 1/2 x 3 1/2	223.0	8.4	145-4000	Opt	Opt	3658	2613	
	Ranger 8	120.0	216.4	81.5	56.8	7.50 14	8-3 1/2 x 3 1/2	292.0	8.8	185-4200	Opt	Opt	3700	2697	
	Ranger 8 (Engine Option)	120.0	216.4	81.5	56.8	7.50 14	8-4 x 3 1/2	352.0	9.6	300-4600	Opt	Opt	3802	2755	
Falcon	6	109.5	181.2	70.0	56.4	6.00 13	6-3 1/2 x 2 1/2	144.3	8.7	90-4200	Opt	NA	2288	1974	
Ford	Fairlane, Fairlane 500, Galaxie 6	119.0	213.7	81.5	56.8	7.50 14	6-3 1/2 x 3 1/2	223.0	8.4	145-4000	Opt	Opt	3606	2311	
	Fairlane, Fairlane 500, Galaxie 8	119.0	213.7	81.5	56.8	7.50 14	8-3 1/2 x 3 1/2	292.0	8.8	185-4200	Opt	Opt	3706	2424	
	All Models (Engine Option)	119.0	213.7	81.5	56.8	7.50 14	8-4 x 3 1/2	352.0	9.6	300-4600	Opt	Opt	3750	2459	
	All Models (Engine Option)	119.0	213.7	81.5	56.8	7.50 14	8-4 x 3 1/2	352.0	9.6	300-4600	Opt	Opt	3755	2468	
Lincoln	Lincoln, Premiere, Continental 8	131.0	227.2	80.3	58.4	9.50 14	8-4 1/2 x 3 3/4	430.0	10.0	315-4100	Std	Std	5016	5441	
Mercury	Monterey 8	126.0	219.2	81.5	57.5	8.00 14	8-3 1/2 x 3 1/2	312.0	8.9	205-4000	Opt	Opt	4079	2730	
	Monterey 8 (Engine Option)	126.0	219.2	81.5	57.5	8.00 14	8-4 1/2 x 3 3/4	383.0	8.5	280-4200	Std	Opt	4261	2798	
	Mtclairair 8	126.0	219.2	81.5	57.8	8.50 14	8-4 1/2 x 3 1/2	430.0	10.0	310-4100	Std	Opt	4298	3 30	
	Park Lane 8	126.0	219.2	81.5	57.9	8.50 14	8-4 1/2 x 3 1/2	430.0	10.0	310-4100	Std	Std	4421	3858	
Thunderbird	8	113.0	205.3	77.0	54.2	8.00 14	8-4 x 3 1/2	352.0	9.6	300-4600	Opt	Opt	3799	3755	
	8 (Engine Option)	113.0	205.3	77.0	54.2	8.00 14	8-4 1/2 x 3 3/4	430.0	10.0	350-4600	Std	Opt	4029	3932	
GENERAL MOTORS CORP.															
Buick	Le Sabre 8-4400	123.0	217.9	80.0	58.8	7.60 15	8-4 1/2 x 3 1/2	364.0	10.2	250-4400	Opt	Opt	2870		
	Invicta 8-4600	123.0	217.9	80.0	58.8	7.60 15	8-4 1/2 x 3 1/2	401.0	10.2	325-4400	Std	Opt	3357		
	Electra 8-4700	126.3	221.2	80.0	59.0	8.00 15	8-4 1/2 x 3 1/2	401.0	10.2	325-4400	Std	Std		3856	
	Electra 8-4800	126.3	225.9	80.0	59.0	8.00 15	8-4 1/2 x 3 1/2	401.0	10.2	325-4400	Std	Std			
Cadillac	8-62, 60	130.0	225.0	79.9		8.00 15	8-4 x 3 1/2	390.0	10.5	325-4800	Std	Std	4775	5080	
	Eldorado 8-62	130.0	225.0	79.9		8.20 15	8-4 x 3 1/2	390.0	10.5	345-4800	Std	Std	7401		
	8-75	149.8	244.8	79.9		8.20 15	8-4 x 3 1/2	390.0	10.5	325-4800	Std	Std	5475	9533	
Chevrolet	Biscayne 1100, 1300; Bel Air 1500, Impala 1700-6	119.0	210.8	80.8	58.1	7.50 14	6-3 1/2 x 3 1/2	235.5	8.2	135-4000	Opt	Opt	3550	2316	
	Biscayne 1200, 1400; Bel Air 1600, Impala 1800-8	119.0	210.8	80.8	58.1	7.50 14	8-3 1/2 x 3 1/2	283.0	8.5	170-4200	Opt	Opt	3570	2423	
	8-1200, 1400, 1600, 1800 (Engine Option)	119.0	210.8	80.8	58.1	7.50 14	8-4 1/2 x 3 3/4	348.0	9.5	250-4400	Opt	Opt	3715		
Corvair	6-500, 700	108.0	180.0	66.9	52.8	6.50 13	6-3 1/2 x 2 1/2	140.0	8.0	80-4400	Opt	NA	2315	2036	
Corvette	8-967	102.0	177.2	72.8	52.3	6.70 15	8-3 1/2 x 3 1/2	283.0	9.5	230-4800	Opt	NA	2640	3672	
Oldsmobile	Dynamic 8-88	123.0	217.6	80.6	58.3	8.50 14	8-4 x 3 1/2	371.0	8.7	240-4400	Opt	Opt	4108	2900	
	Super 8-88	123.0	217.6	80.6	58.3	8.50 14	8-4 1/2 x 3 3/4	394.0	9.7	315-4800	Opt	Opt	4122	3176	
	8-98	126.3	220.9	80.6	58.3	9.00 14	8-4 1/2 x 3 3/4	394.0	9.7	315-4800	Std	Std	4365	3887	
Pontiac	Catalina 8-6021	122.0	213.7	80.7	58.4	8.00 14	8-4 1/2 x 3 3/4	389.0	8.6	215-3600	Opt	Opt	3935		
	Ventura 8-6023	122.0	213.7	80.7	56.7	8.00 14	8-4 1/2 x 3 3/4	389.0	8.6	215-3600	Opt	Opt	3990		
	Star Chief 8-6024	124.0	220.7	80.7	58.2	8.00 14	8-4 1/2 x 3 3/4	389.0	8.6	215-3600	Opt	Opt	3995		
	Bonneville 8-6027, 6028	124.0	220.7	80.7	56.4	8.00 14	8-4 1/2 x 3 3/4	389.0	8.6	281-4400	Opt	Opt	4065		
STUDEBAKER-PACKARD CORP.															
Studebaker	Deluxe, Regal 6-80-S	106.5	175.0	71.4	59.2	5.90 15	6-3 x 4	169.6	8.3	90-4000	Opt	NA	2592	2046	
	Deluxe, Regal 8-60-V	108.5	175.0	71.4	58.9	6.40 15	8-3 1/2 x 3 1/4	259.2	8.8	180-4500	Opt	Opt	2941	2181	
	Hawk 8-60-V	120.5	204.0	71.3		6.70 15	8-3 1/2 x 3 3/4	289.0	8.8	210-4500	Opt	Opt	3207	2650	

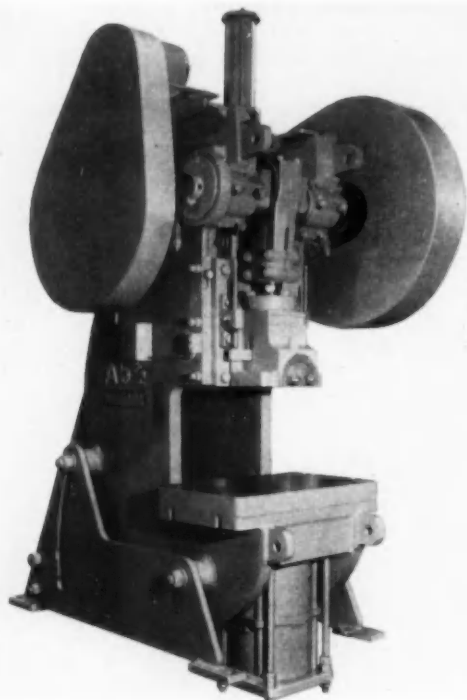
ABBREVIATIONS: *—Does not include transportation charges, state or local taxes or any optional equipment. Does include Federal Excise Tax and handling charges.
NA—Not available. Opt—Optional at extra cost. Std—Standard equipment.

NEW

PRODUCTION and PLANT

EQUIPMENT

FOR ADDITIONAL INFORMATION, please use reply card at back of issue



Niagara redesigned OBI press has been modernized to meet many types of press requirements. It features a minimum number of parts and simple construction.

Modernized Mechanical Sleeve OBI Presses

SERIES A Inclinable OBI presses have been redesigned to meet the requirements of modern metalworking needs.

Continuing to feature Niagara's multi-point mechanical sleeve clutch, the line is described as suited for continuous work requiring clutch engagement and disengagement at every press stroke.

Conspicuous in the design modernization is the slide, with its solid casting brought forward to provide solid backing for the dies. Flat surfaces on the front and sides simplify fitting feed roll lifters and other attachments. Rigid, multiple "V" gibs assure accurate alignment, balanced loading and greater guiding surface. Additional refinements include an air power inclining device (optional), split belt guard (optional) to facilitate raising or lowering the slide, and quick adjusting friction clamp knock-out rods.

Fewer parts and simple construction make it an economical and safe production unit. There are no complicated electrical circuits, relays, limit switches, solenoids, palm buttons, air valves or rotary air connections.

Built in 13 standard sizes with shaft diameters from 1¼ to 6½ in., the line covers a capacity range of 5½ to 190 tons. *Niagara Machine & Tool Works.*

Circle 60 on postcard for more data

Inclined Bed Lathe

THE new Ensign 13 in. lathe, available at 24 or 36 in. between centers, offers spindle speeds up to 1500 rpm. This machine has a hardened and ground standard LO taper on the spindle and a 19/16 in. bore. A brochure is available from the Bently Industrial Corp.

Circle 61 on postcard for more data

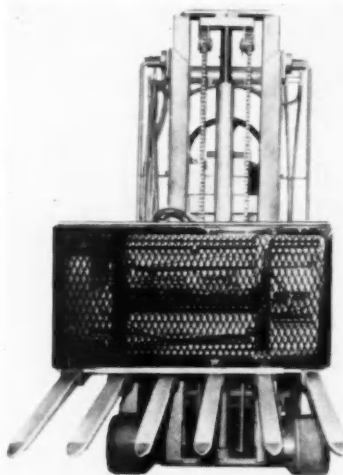
Boring Mill

THE availability of a heavy duty, table type, 3-in. horizontal boring mill has been announced. This machine incorporates the finest features of progressive machine tool design, and has a ground spindle running in roller bearings at both ends. There is a range of 16 spindle speeds from 12.5 to 1500 rpm, and all gears in the headstock are hardened and ground. There is rapid power traverse to the headstock, spindle, facing slide, and saddle, in all directions. *Index Industrial Corp.*

Circle 62 on postcard for more data

Push Off Device

A PUSH off device with side shifter and multiple forks, for establishments using a take it or leave it pallet system, has been developed. This multi-purpose equipment may



Lewis special push-off attachment

also be employed in moving non-palletized loads, and simplifies carrier loading with its push off device. In addition to the standard wooden pallet there is a corrugated steel pallet specifically designed for use with the push off equipment also available. *Lewis-Shepard Products, Inc.*

Circle 63 on postcard for more data

Hydraulic Plate Shear Featuring Cut Control



New Hydraulic shear made by Pacific Industrial Mfg. Co.

CUT control is featured in the new hydraulic plate shear introduced by Pacific Industrial Mfg. Co. This machine is provided with adjustments for rake angle, knife clearance, holds down tonnage, and back gauge setting and positioning. These adjustments eliminate twists or camber of light metals and permit cutting of soft metals without marking them. Twenty gauge to $\frac{3}{4}$ in. plate

can be cut with a remote foot pedal operating up to 70 strokes per minute.

Circle 64 on postcard for more data

Infra-Red Measuring

THE American Steel and Wire Div. of the United States Steel Corp. has recently completed preliminary tests on a new infra-red device for measuring the speed of red-hot steel

rod in the rolling operation at their Cuyahoga Works in Cleveland, Ohio.

This device, designed and built by Lindly and Co., Inc., is a double infra-red sensitive photoelectric device. By measuring the length of time it takes the leading and trailing ends of a length of heated steel rod to pass two points a known distance apart, the speed of the steel at various stages of rolling can be computed. The entire equipment is portable and consists of two units, a detecting head and the associated electronic section.

This instrument should prove to be of considerable value in increasing knowledge of proper roll and pass design and in the improvement of rolling practices.

Circle 65 on postcard for more data

Welder Has Giant Reach

ADUAL spot welder has been announced by Precision Welder and Flexopress Corp. The unusual machine is designed for the aircraft industry where it will be used to spot weld through stainless steel sections to military specifications.

Welding electrodes are located at the extreme tip of the arms, which have an 11 ft. reach. These arms may be set in either the horizontal or vertical plane at constant height. Pressure at the electrodes is 1200 to 1500 psi.

Circle 66 on postcard for more data

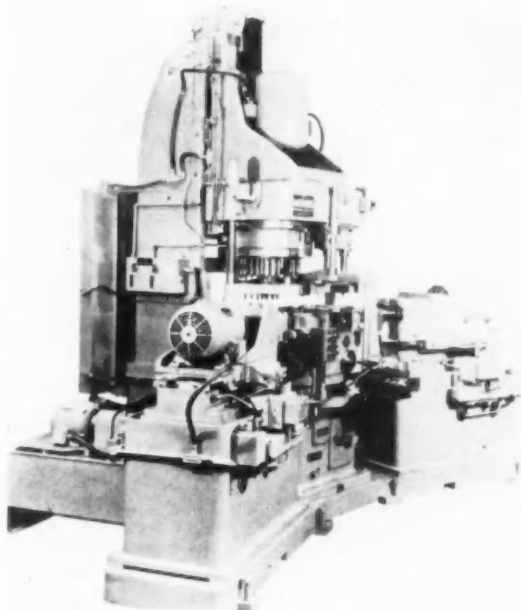
High Production Multi-Spindle Drill Unit

A 26 SPINDLE vertical drill unit, with clusters operating at both load and transfer positions of four different stations, has been designed. Designated Model 312-S, the vertical column indexing machine uses a 30 in. diameter table. It has a five station automatic hydraulic index to perform 34 operations automatically on air compressors through a two cycle process.

The machine incorporates an 18 in. Morris way type hydraulic slide unit rear mounted on the vertical column, as well as two 12 in. way type units supported on pedestal and platen, for horizontal operations at stations 2 and 5. Each of these horizontal drill units powers a four spindle head, with those at station five utilized for a taper ream operation. The Morris Machine Tool Co.

Circle 67 on postcard for more data

Morris Model 312-S multi-spindle drill unit has completely automatic operation with the exception of loading and unloading. Each of the standard drill units has independent feeds and speeds, permitting adjustment without affecting the entire machine.



Semi-Automatic Microhardness Tester



This instrument need not be touched at any time during the test cycle as removal of the indenter from the specimen is fully automatic. Vertical adjustments of the elevating screw, to accommodate thicker or thinner work specimens, is accomplished by turning the units knurled ring nut. The machine also has three adjustable toes at the base for leveling.

MODERN styling has been incorporated into the design of this new micro-hardness tester which has been designated as the model LL Tukon. Introduced by the *Wilson Mechanical Instrument Division, American Chain and Cable Co., Inc.*, the device will expedite the testing of cutting tool carbide tips, electroplated and sheet

metal surfaces for hardness properties. The instrument is equipped with a Bausch and Lomb microscope. To start a test cycle with a specimen in position, the operator merely has to press a button. Load application time can be varied from a time cycle of from 3 to 30 seconds.

Circle 68 on postcard for more data

Sheet Feeding Table

INCORPORATING a ball bearing screw operating through a chain and sprocket drive, a line of mobile sheet feeding tables offers a range of sizes and capacities for sheet feeding and similar applications requiring a broad elevating top.

Capacities range from 4000 to 10,000 lb. Top sizes can be had from 24 by 96 to 36 by 144 in. Elevating range is 24 in. minimum to 40 in. maximum. Elevating effort is derived from a two speed gearbox, crank driven and self locking to pre-

vent load drift. *Jarke Manufacturing Co.*

Circle 69 on postcard for more data

Grinding Disks and Belts

RESIN bonded, aluminum oxide coated, fiber disks and cloth belts are featured in the new *Behr-Manning Co.*, line. Fiber disks, in the grit range from 24 to 60 inclusive, have proved effective on stainless steel, brass, bronze and other alloys.

Circle 70 on postcard for more data

Rivet Spinning Tool

A CHANGE of material is featured in a rivet spinning tool. It is said the new tool produces a good finish, and has eliminated the tearing of rivets caused by the tool galling. The riveting tool is now hard carbide, and measures 9/16 in. in diam, and 3 5/16 in. long. This tool is provided with a riveting head on each end. A manufacturing firm, who tested this tool, reported it produced 36,000 pieces before needing reconditioning. *Kenametal, Inc.*, who manufactured this tool, designated it as the K82.

Circle 71 on postcard for more data

Heavy Duty Nibbler

A NEW heavy duty nibbler that will cut through 8 gauge mild steel or 10 gauge stainless at the rate of six feet per minute has been announced by the *Buckeye Tool Corp.* Designed for straight or contour



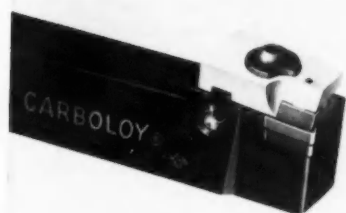
Nibbler leaves both edges undistorted

cutting of sheets, to large for stationary machines, it proves an ideal portable cutting tool. This tool is 15 in. in length and weighs 12 1/2 lb. Air flow to the motor should enter through a 3/8 in. ID hose at 90 to 100 psi for maximum cutting efficiency.

Circle 72 on postcard for more data

Insert Tool Holders

A TOOLHOLDER for disposable carbide inserts featuring an indexing, fully adjustable chip breaker has been introduced. Called the Carboley "Adjust-O-Breaker" the toolholder is designed to provide positive setting of the chip breaker. The solid carbide chip breaker has a double edge, and is



"Adjust-O-Breaker" Negative rake toolholder



Assembly details of the disposable tip toolholder

full floating to prevent strain cracks and point pressure.

Five styles are available in both right and left hand models. These tools have been tested on a 4340 steel forging, of 300 Brinell hardness, using .017 feed, taking a 1/4 in. cut, at 240 sfpm. A nicely curled chip was said to have been produced in this test.

Circle 73 on postcard for more data

New Welding Fixtures

WELDING fixtures have been introduced in a new design. This new line employs the pantograph principle, and is offered in two models; a standard one arm, and a standard double arm pantograph. The single arm model can be utilized in the same manner that a ram type manipulator is used. Other features of this line include straight line welding to 16 ft, precision, rigid construction, motorized vertical travel, and centralized operator station. The carriage beam may be tilted to accommodate angle welding. These machines have been developed by the L and B Welding Equipment Co.

Circle 74 on postcard for more data

Ultrasonic Cleaning Unit

THE National Ultrasonic Corp. announced a new unit for small part cleaning applications in which average energy levels are required. This cleaning unit features a one gallon stainless steel tank, with rounded corners to facilitate easy rinsing of contaminants removed by ultrasonic energy. Twenty-five per cent of the bottom of the tank is covered with driving elements and it has 12 square inches of actual radiating surface.

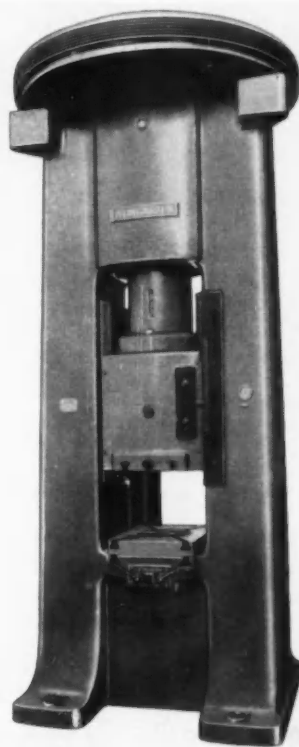


Cleaning small parts with ultrasonic energy

Circle 76 on postcard for more data

Percussion Screw Press

A NEW line of machines, for metal forming, has been introduced by the Cosa Corp. This line is referred to as the Weingarten Percussion Screw Presses. They are available in



The ram can be held in any position on the new Cosa press line

numerous sizes ranging from 80 to 3000 tons pressure. An outstanding feature of this machine is the variable stroke and pressure control by dial and scale.

Circle 75 on postcard for more data

**AUTOMOTIVE INDUSTRIES
KEEPS YOU INFORMED**

Dual Ignition

DEVELOPMENT of a dual ignition system for V-8 powered International fire truck chassis has been announced by the motor truck division of International Harvester Co.

The system, which is offered as optional equipment on International V-461 and V-549 gasoline-fueled V-8 engines, includes an additional distributor, a second set of spark plugs, a second coil and high tension wiring. A special switch permits use of both ignition systems simultaneously, or either one independently. Provision also has been made to handle accessories.

According to International, both systems should be operated simultaneously to prevent fouling of spark plugs. In the event of failure to one system, the other will continue to function.

Engineering tests reveal that there is no noticeable torque or horsepower variation in engines equipped with the new dual ignition system. Horsepower ratings of the 461 and 549-cu in. displacement International V-8's are 226 and 257, respectively.

Dual ignition engines are available on International models V-196, V-206, VCO-196 and VCO-206.

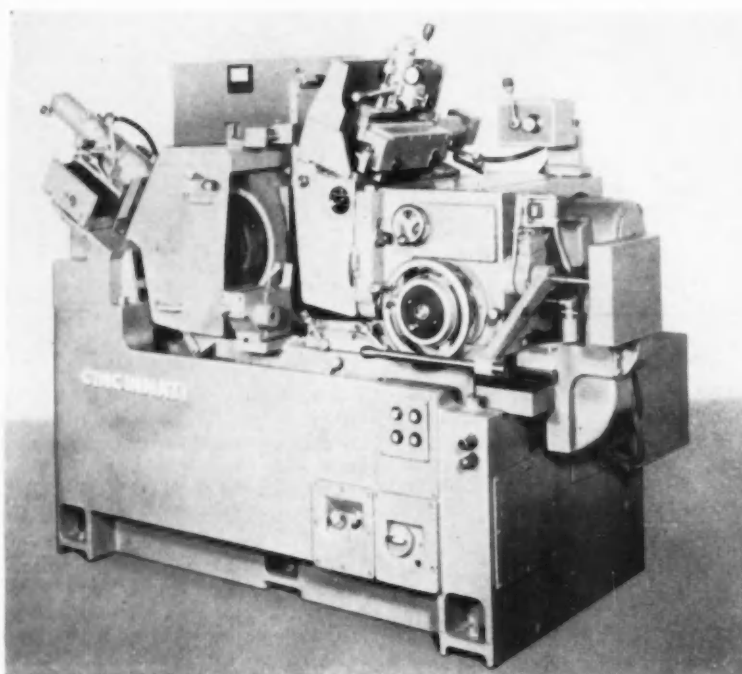
Circle 77 on postcard for more data

Deburring in Fluid Mass

A NEW unit for fixtured deburring has been introduced by the Mecca-Finish Corp. It has the specific advantage of having two independently operated spindle heads, and can be supplied with interlocking spindle stations. The parts are mounted on air operated spindle fixtures, and submerged in a fluid abrasive mass, while rotating at approximately 2000 sfm. This machine can produce up to 240 pieces per hour.

Circle 78 on postcard for more data

NEW PRODUCTION EQUIPMENT and PLANT



Cincinnati centerless grinder equipped with Filmatic spindle bearings

Centerless Grinder Designed for Short Run Work

A CENTERLESS grinder designed for short run work, featuring quick and easy changeover and operator convenience, has been developed.

Designated the Model 210-6, the 10 hp machine can handle work pieces up to three inches OD. It has a standard wheel width of six inches with provisions for wheels up to eight inches wide.

Out of the way location of the coolant tank and hydraulic unit, plus a recess under the machine, allows the operator to stand close to the work for dead passing or workblade adjustments. The machine is also equipped with a mist collecting nozzle. A product of The Cincinnati Milling Machine Co.

Circle 79 on postcard for more data

Polishing Machine

AN improved design of a standardized automatic polishing machine for finishing a wide variety of shapes and sizes of reflectors and bowl-shaped metal parts is now available. This machine will finish reflectors, oval shapes, bubble-type surfaces, conical, cylindrical and bowl shapes in a fully automatic cycle of operation. Parts made of aluminum clad material, stainless steel, low-carbon steel, copper and brass can be effectively finished on the Acme reflector polishing machine.

One feature of the machine is the automatic control of finishing wheel pressure. This prevents excessive pressures encountered when contact surfaces change from a large to a

small radius as in oval reflectors. Air line pressure directed to the cylinder controlling the wheel contact pressure is automatically varied by a cam and switch arrangement to suit part configuration requirements.

Another feature is the automatic reversal of wheel rotation during the finishing cycle. This enables both cutting and coloring operations to be performed in one work cycle.

Basically, the machine consists of a modified Acme Model G-4 adjustable lathe with a special spindle housing mounted on a semi-automatic machine base, and an Acme Model E-10 semi-automatic machine with a standard right angle attachment.

Electric motors drive the work spindle and finishing wheel. Complete

adjustment for all of the machine motions, wheel and work spindle locations give the machine broad work flexibility. Acme Mfg. Co.

Circle 80 on postcard for more data

End Finishing Machine

FOR simultaneous deburring, facing, and chamfering as well as drilling, reaming or light spinning operations, Pines Engineering Co., Inc., announces a New Improved Model 600 End Finishing Machine. The machine has been completely redesigned by Pines. The new machine is a more rigid production unit with controlled alignment between the work holding jaws and the rotating tool holder. New features simplify set-up, operation, and maintenance.

Circle 81 on postcard for more data

Cable Type Electric Hoist

SHAW-BOX Crane and Hoist Division, Manning, Maxwell, and Moore, Inc., have introduced new single and two speed models in their electric



Hoist has slow speed for close spotting

hoist line. Both models are offered in 1/2 and 1 ton capacities, in all standard voltages, with choice of several lifting speeds.

Circle 82 on postcard for more data
(Turn to page 86, please)



the hard facts

Brinell Testing is a simple operation. As a step in quality control, its effectiveness depends upon the thoroughness with which it is applied, and tolerances which the manufacturer establishes.

Hardness of the steel is fundamental to spring performance. Here it is tested on the latest type direct reading Brinell hardness tester. This is typical of the care that goes into Burton Springs . . . every step of the way from engineering to the finished product.

That's why so many prominent truck and off-highway equipment manufacturers know they can depend on Burton Springs.

We invite you to consult us for your next spring requirements.

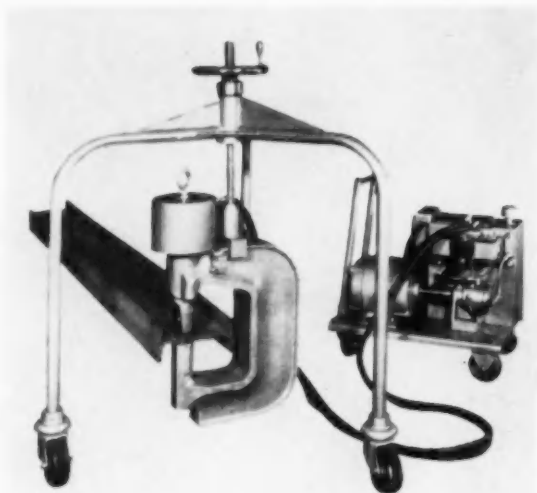
BURTON

AUTO SPRING CORP.

Vital Support for the Automotive Industry

WESTERN AVENUE AT FORTY-EIGHTH STREET, CHICAGO 32, ILLINOIS





Deep Throat Portable Hydraulic Punch Press

HOLES up to 11/16 in. can be punched in 3/4 in. mild steel with the hydraulic press designed by W. A. Whitney Mfg. Co. Smaller diameter holes can be punched through heavier thicknesses. The

deep throat design enables the operator to punch the center of the web on wide flanged I-beams and channels. The portable device consists of a tripod punch and a power unit.

Circle 83 on postcard for more data

The new hydraulic punch press line by W. A. Whitney Mfg. Co. is available in 20, 30, 50, 70, and 90 ton capacities, designated by model numbers 721, 731, 751, 771, and 791 in the same order. The cycle time varies from 12 seconds in the 721 up to 19 seconds in the 791, with throat depth ranging from 5 1/2 to 25 in.

Releasing Tapholder

A NEW releasing tapholder, that is self aligning and full floating, has been announced by the *Burgmaster Corp.* The desired amount of float is arrived at by adjustment of the retainer ring.

Circle 85 on postcard for more data

Ultrasonic Flaw Detector

A NEW ultrasonic flaw detector has been developed by *Sperry Products, Inc.* The instrument is compact and lightweight, and is suitable for both contact and immersed inspection. The full use of printed circuits and transistors has resulted in a versatile instrument with many capabilities that is yet small in size and easy to handle.

The new Reflectoscope can be mounted directly on scanning bridges now in use in various plants. Designed for application in the laboratory or on the production line, it has many new features.

These include a 12 in. dual trace display tube that is bright enough to be seen from a considerable distance, and a two-color display that enables flaw indications to be easily distinguished from range marks. There are four fast-acting flaw gates with separate channel indication for signaling the presence of flaws or reduction of back reflection. The four channels are broadly adjustable.

The frequency ranges of the UI Reflectoscope run from 1.0 to 25.0 megacycles. Weighing 100 pounds, the instrument is 18 in. high, 14 1/4 in. wide and 21 in. deep. All voltages, including filaments, are internally regulated.

Circle 86 on postcard for more data

Versatile Rolling and Flanging in One Operation



The Curvit Division of MacLodyne Corp. has introduced the new Curvit model C-155 coiler with a flanging attachment that can roll 5/16 to 3/4 in. flanges in 30 in. OD stainless steel rings at a rate of 90 per hour. The flanging attachment operates under 6000 psi. at 80 psi. air pressure and the drive die roller is reduction gear driven by a 5 hp. electric brake motor. The new line will coil pipe, tube, wire, flat strap stock and solid bar stock up to 2 1/2 in. OD. Setup involves three operations; installing die rollers, adjusting the radius feed, and setting the coiler pitch.

Circle 84 on postcard for more data

Carbide Boring Tool

Carbide boring tools, that were designed specifically for jig boring small bores, have been introduced in a new line. These tools are available in sets or they are furnished separately for use in standard boring tool holders. The range of application, in this line, is from 1/16 to 1 in. It is said there is no whip action due to off-center mass, and vibration is eliminated. *Wetmore Tool and Engineering Co.*

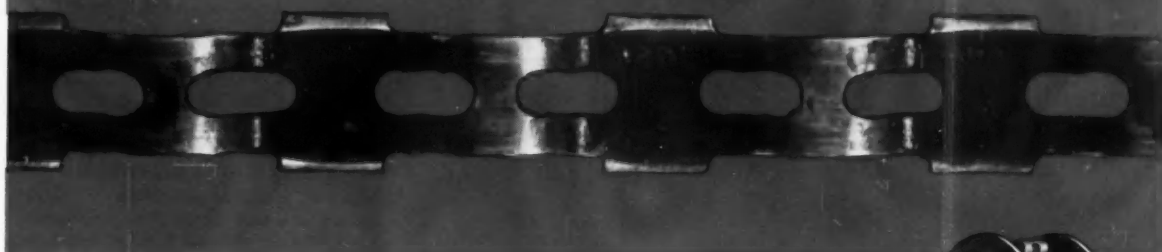
Circle 87 on postcard for more data
(Turn to page 88, please)

Exclusive Design

OF SEALED POWER

STAINLESS STEEL OIL RINGS

assures an end to oil ring clogging



Here you see a section of Sealed Power's stainless steel oil ring after fifty thousand miles of service. Note how clean the surface, how open the vents.

The stainless steel used in this Sealed Power oil ring is not affected by the acids and gases of internal combustion; does not pit or corrode; carbon does not cling

to it, varnish doesn't build up.

Thus the main cause of carbon build-up and consequent oil ring plugging is eliminated. Because of the self-expanding design, the oil vents in Sealed Power stainless steel oil rings are not blocked by springs in back of them. They permit the free flow of oil back to the crankcase.



OTHER KEY FEATURES

- They hold their fit in the cylinder • They stop smoking even under high vacuum operation
- They are side-sealing • They are quick seating
- They are chrome-plated for long life

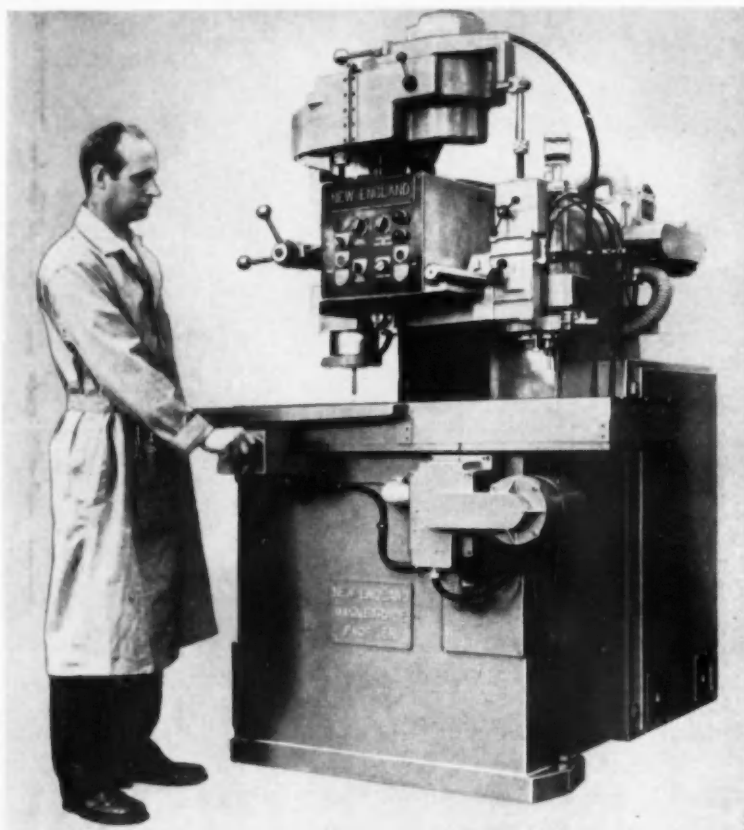


SEALED POWER CORPORATION, MUSKEGON, MICHIGAN • ST. JOHNS, MICHIGAN • ROCHESTER, INDIANA • STRATFORD, ONTARIO
DETROIT OFFICE • 7-236 GENERAL MOTORS BUILDING • PHONE TRINITY 1-3440

Sealed Power Piston Rings

PISTONS
CYLINDER SLEEVES

*Leading Manufacturer of Automotive and Industrial Piston Rings Since 1911
Largest Producers of Sealing Rings for Automatic Transmissions and Power Steering Units*



Automatic Profiler for use with Tracer Control

(Left)—New England Machine and Tool Co.'s automatic profiler

KNOwn as the Magnettrace, a new automatic profile machine has been placed on the market. This machine operates by following a prepared sheet steel template and is said to reproduce complex irregular shapes usually associated with plain milling operations. The exceptionally high accuracy of the profiler results from the rigidity of the machine and the elimination of backlash in the slide motions. The tracer system is so sensitive it only requires a stylus deflection of .0002 in. to activate the table and cross head drives. Where high production quantities are involved this machine is designed to permit the addition of tooling for operation under fully automatic cycle control. Pratt and Whitney Co., Inc., is selling this machine for The New England Machine and Tool Co.

Circle 88 on postcard for more data

1959 Motor Vehicle Registrations

(Continued from page 72)

six states cooperated in this study for 1959.

The 3.3 per cent increase in 1959 over 1958 is a complete reversal of the downward trend experienced from 1955 through 1958. The rate of increase for 1955 was 6.9 per cent. In 1956 this dropped to 4.0 per cent, and 3.3 per cent in 1957. By 1958 the rate of increase showed a further decline to 1.7 per cent, which was the lowest percentage increase of any year since 1945. With the 1959 rate of increase nearly double that of 1958 it would appear that once again total registrations are on the upward grade.

It is estimated that passenger car registrations will total 58,906,632 as compared with 57,072,533 in 1958, a gain of 3.2 per cent. Trucks

and buses combined will total 11,190,841 as against 10,790,409, up 3.7 per cent from 1958.

California will lead the states with 7,251,000 car, truck and bus registrations. New York, Texas Pennsylvania follow, in the order named, with well over 4 million. Ohio, Illinois and Michigan are in fifth, sixth, and seventh place with registrations in excess of 3 million. New Jersey and Florida will have registrations of 2.3 and 2.2 million respectively and Indiana is in tenth place with 1.9 million. Oregon is presently showing a decrease in truck and bus registrations of 1.3 per cent, but it is quite likely that when final returns are in, this decrease will be changed to a slight increase.

These 10 leading states which are 20 per cent of the 50 states listed account for 37,861,600 or 54 per cent of the U. S. total registrations. In addition to these states, 17 others are expected to have over one million registrations each.

Present indications are that Mississippi will lead in anticipated increases in total registrations with 11.1 per cent, followed by Florida with 8.2 per cent, South Carolina 7.2 and Arizona and North Carolina each with 6.4 per cent. Twenty-seven states will equal or better the average 3.3 per cent increase for all states. Nevada has the least increase with less than 1 per cent.

Complete details of this forecast of 1959 motor vehicle registrations will be found in the accompanying table. Final data will be published in the 1960 Statistical Issue of AUTOMOTIVE INDUSTRIES, released March 15, 1960.

CLEARING
ED-2-700-400-100-421

YOU SAVE WITH CLEARING PRESSES

With a bottom drive press, the main floor is cleared for better material handling, increased safety and improved appearance. The lower level simplifies scrap removal and equipment maintenance.

WITH A LINE LIKE THIS...OR A LINE OF TORC-PAC O.B.I.'s—CLEARING PROVIDES THE ULTIMATE IN METAL FORMING EFFICIENCY

Clearing is now building a line like the one above. Presses like these equipped with moving bolsters and the latest features and control devices (as shown at right) are the way to increase profits and production by combatting rising material and manufacturing costs.

Undoubtedly, your production problem is different from the one solved by the press line above. However, whatever the problem—whatever the type or size of press equipment, feeding equipment and dies are best for you—you can rely on Clearing for the most effective solution. Call on Clearing at any time.

*Bulletins on Moving Bolster and
Bottom Drive Presses are available now.*

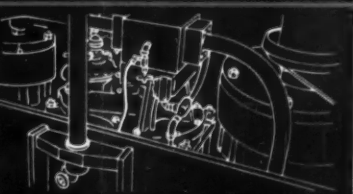
Clearing division of U.S. Industries, Inc. manufactures Torc-Pac presses, hydraulic presses, Clearing-Axelson and Clearing-Harrison lathes, dies and special tooling, and special equipment for the aircraft and missile industry.



360° Limit Switch
speeds changeover time.



Automatic Shutheight Control
speeds adjustment, increases accuracy.



Hydraulic Overload Protection
increases safety.

usi Clearing

DIVISION OF U.S. INDUSTRIES, INC.
6499 W. 65th Street, Chicago 38, Illinois

Circle 142 on Inquiry Card for more data

NEW

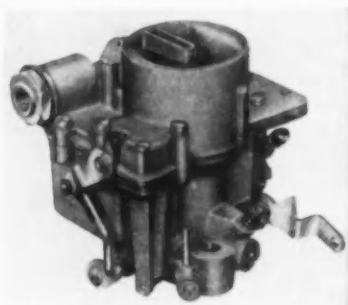
PRODUCTS

AUTOMOTIVE-AVIATION

FOR ADDITIONAL INFORMATION, please use reply card at back of issue

Corvair carburetor

A new carburetor for the Chevrolet Corvair has been announced. The new model "H" carburetor is the single barrel, down draft type and completely new in design. This unit features the throttle body and float bowl integrated into one die cast



aluminum body, and a new radial type booster venturi cluster is employed.

In addition, main well tube inserts are used in conjunction with the main well tubes. These inserts provide a smooth fuel flow through the metering orifices of the idle and part throttle systems. *Rochester Products Division of General Motors Corp.*

Circle 41 on postcard for more data

Belt Grinder

Deburring, descaling, grinding and polishing can all be accomplished on a new oscillating belt grinder. It is said the problem of belt tracking has been completely eliminated, while belt changing is a simple matter of slipping off one belt and another on. Belt oscillation is maintained and controlled by air-jet sensing. Adjustability of the conveyor table height allows a work belt clearance from zero to five in., from the conveyor to the abrasive work belt. The conveyor is driven by a ½ hp motor with speeds ranging from 60 to 120 sfm. The work belt is driven by a five hp motor at 5000 sfm. *Sales Service Mfg. Co.*

Circle 42 on postcard for more data

Gearing Units

Moduline gear drives with an output speed of 420 rpm are now available. These units are especially applicable for use in side entry agitators, and permit the use of concentric gear motors in an output speed usually available only in offset shaft construction. Previously, these units were available with output speeds up to 350 rpm.

New change gear sets to provide this output speed are now available for Moduline unit sizes one, through five inclusive. The total ratio of concentric shaft units using the new sets will be 4.17 to 1, producing an output speed of approximately 420 rpm with an input speed of 1750 rpm. When used with right angle output units, the output speed will be 280 rpm with a total ratio of approximately 6.2 to 1. *Westinghouse Electric Corp.*

Circle 43 on postcard for more data

Laminated Plastic

A new glass base, epoxy resin laminated plastic has been announced. It is designed for use in both normal and elevated temperatures, and it is said to exceed the strength requirements of military specifications. A ¼ in. thick sheet of this plastic, exposed for one hour to 300 degree heat, was said to retain at least 68 percent of its flexural strength. This line is furnished in sheets only, and has a range from .010 to 1 in. in thickness. This material, up to 3/32 thick, may be cold punched. *Taylor Fibre Co.*

Circle 44 on postcard for more data

Foaming Spray

An extremely low foaming spray cleaner is being produced for use on all ferrous, and non ferrous metals, except aluminum at 100 to 140 degrees operating temperatures. It removes grease, oil and drawing compounds. *Northwest Chemical Co.*

Circle 45 on postcard for more data

Fiber Glass Tank

A new molded fiber glass tank, for use in spraying or storing corrosive liquids, has been announced. This tank has a 200 gallon capacity, and is translucent so that the liquid level is visible. It is 58 in. in length, with a 32 in. diameter, and comes in a selection of colors. *Molded Fiber Glass Body Co.*

Circle 46 on postcard for more data

Magnetic Holder

A magnetic dial indicator holder has been developed for inspection applications and fine adjustments on machine tools. The "Magna-Holder" can be attached in any desired position and has a swivel clamp to meet



angular requirements. The adjustable clamp will accommodate various indicator shank sizes by means of interchangeable sleeves. This device is said to be unaffected by any vibration that might be encountered on a machine tool. *Mueller Gages Co.*

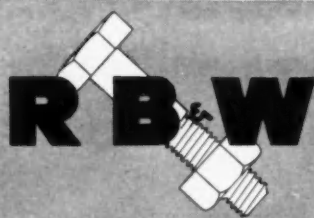
Circle 47 on postcard for more data

Polishing Head

A new belt head for grinding and polishing aluminum, brass, and steel castings has been designed and built. Positive belt control, at heavy work areas, is provided by a specially designed, and air operated, scanning eye, which prevents belt run off. *Murray-Way Corp.*

Circle 48 on postcard for more data

(Turn to page 92, please)



FASTENER BRIEFS

RUSSELL, BURDSALL & WARD BOLT AND NUT COMPANY



Technical-ities

By John S. Davey

Quick facts on cold heading

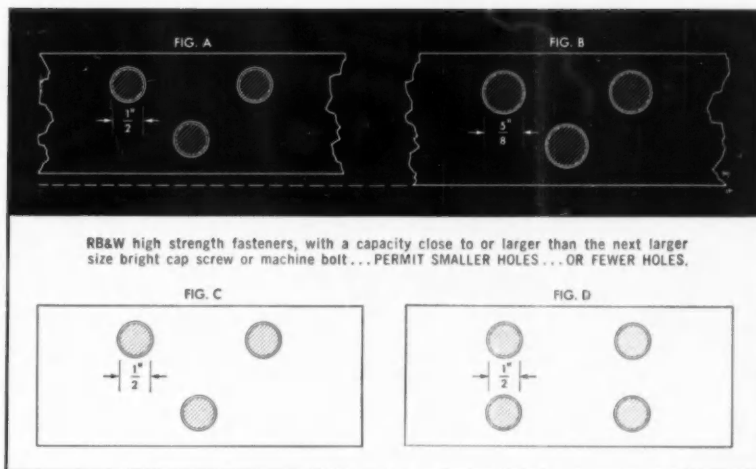
Compared to machining, cold heading gives stronger pieces at less cost. Also, the headers automatically control quality because unsound material cannot be used. While the scope of cold headers is wide indeed, it pays to design for them right at the start.

Some rules of thumb to guide you:

1. You save money after a run of 25,000 pieces (which pays for the set-up).
2. Maximum length of parts runs about 6 inches. Maximum volume of upset is equivalent to length of stock $4\frac{1}{2}$ times its own diameter. (With special operations, up to 26 diameters have been achieved!)
3. Various metals and alloys are suitable. But keep carbon content in steel to under 0.45.
4. Concentric pieces are easier to form, though eccentric and serrated shapes are practical.
5. Avoid sharp corners. Allow generous radii.
6. Because upsets are usually cylindrical, oval or round shapes take less trimming than square or rectangular.
7. Hollow upsets tend to form cracks at edges of recess, so avoid them.
8. Embossing raises costs.
9. No problem heat treating short sections. But long sections are apt to be distorted.

When in doubt, contact an expert in cold heading.

How high strength fasteners affect the holes they fill



As simple a matter as the selection of fasteners can permit changes for better design... and also improve production costs and service life.

In sketch "A", for example, you see one difference from use of RB&W high strength fasteners instead of machine bolts or bright cap screws, as in "B". You use a smaller size fastener. Holes are therefore smaller. The metal section, in turn, can then be smaller for a saving in material and weight. The costlier the materials (copper bus bars as a case in point), the more significant the cost savings.

In sketch "C", fill the 3 holes with $\frac{1}{2}$ " high strength bolts, and you have a load capacity close to 40,000 pounds. That's the same as developed by 4 bright cap screws filling holes in Sketch D. It costs less to drill and less to fill the 3-hole design.



RB&W High Strength Fasteners are now identified by this new marking as well as 3 radial dashes. They have the proper balance between ductility and hardness required in high carbon units.

EFFECT ON PERFORMANCE AND PRODUCTION

When tightened to their full load, high strength fasteners not only *stay* tight—even under vibratory conditions—but also exert high clamping force. It has been shown that, under high compressive forces, hole areas gain extra resistance to fatigue cracks.

What's more, the high friction developed virtually locks members together, prevents slippage. Holes, therefore, need not be perfectly aligned since they can even be slightly oversized without detriment.

There's an RB&W Fastener Man ready to aid you in working with high strength bolts—in the design stage or as replacement for SAE grade 1 or 2 steel fasteners or for rivets. Write for helpful booklet DC-1, Russell, Burdsall & Ward Bolt and Nut Company, Port Chester, New York.



Plants at: Port Chester, N.Y.; Coraopolis, Pa.; Rock Falls, Ill.; Los Angeles, Calif. Additional sales offices at: Ardmore (Phila.), Pa.; Pittsburgh; Detroit; Chicago; Dallas; San Francisco.

Sealed Motor

A new fractional horsepower motor that features sealed in lubrication has been announced. This small motor has been designed for variable applications in aircraft and industrial fields. It would be ideal as a cool air circulator inside cabinets housing electronic equipment or other inaccessible areas in aircraft. This



unit could be employed as a drive motor for a coolant pump on a machine tool. It is built to operate in temperatures from -10 to 250 degrees and the unit-bearing rotor turns on a stationary shaft at 2600 to 3200 rpm with recommended loads. *Howard Industries, Inc.*

Circle 49 on postcard for more data

Heavy Duty Transmission

Development of a compact, synchronized, five speed transmission has been announced. It is said to have increased capacity over designs of comparable size. The unit, known as the 5000 series, weighs 295 lb and has a torque range rating of 450 lb ft with an overall measurement of 24 11/16 in. *Dana Corp.*

Circle 50 on postcard for more data

Electric Brake

A new electric brake for fractional hp motors has been announced. This unit will be known as the SELENIBRAKE-jr. It was designed for both single and three phase ratings up to, and including 3/4 hp. It is ready for instant service, being equipped with input cord and plug, and output terminal. The largest size measures 8 by 8 by 10 in., and can be wall, or bench mounted. *American Rectifier Corp.*

Circle 51 on postcard for more data

Electrical Governor

An electrical frequency sensing governor for use on gasoline and diesel engines, and gas and steam turbines has been developed. Designated model EFG, the new unit is designed for constant speed control over a 10 percent range in 400 cycle service, and over a 30 percent range in 50/60 cycle service.

The sensitivity and response characteristics of this governor are measured in milliseconds and the frequency circuit operates within three milliseconds of the time that the smallest speed change occurs. *Westinghouse Electric Corp.*

Circle 52 on postcard for more data

Aluminum Muffler

An aluminum muffler has been designed and tested, and is expected to be released before the end of the year. This muffler was designed to take advantage of thermal and casting qualities found only in aluminum. In tests, the maximum heat achieved at 110 mph was 785 degrees, while average driving speed temperatures ranged 350 to 425 degrees. *Reynolds Metals Co.*

Circle 53 on postcard for more data

Table Torque tester

A table size torque tester for checking various torque tools has been developed. This tester utilizes the dead weight method and has a range of 3 ounces-inch to 150 pounds-foot. The aluminum, chrome plated balancing beam is 24 in. long and graduated in increments of 1 in. *Apco Mossburg Co.*

Circle 54 on postcard for more data

Bus Duct

Bus duct to distribute high frequency power, with minimum voltage drop, and with little change in relationship is now available. Maximum voltage drop at 400 cycles per second is 1.28 volts per 100 ft, and this duct will operate, it is said, at frequencies up to 1000 cycles per second. Nearly perfect phase relationship and wave form are maintained, since individual conductors in the four channel aluminum housing are continually transposed and rotated, while the housing grounds stray radio frequencies. *Westinghouse Electric Corp.*

Circle 55 on postcard for more data

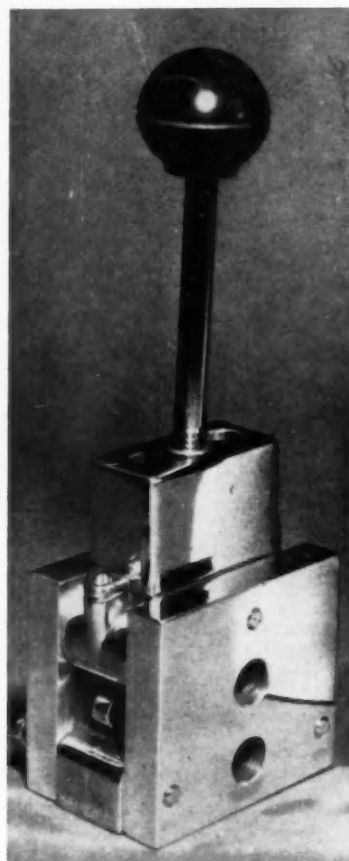
Lightweight Filter

A new lightweight, stainless steel, wire mesh filter element has been developed by a new manufacturing process. This method locks all the filter element components together under high pressure, and is said to keep the filter free of built in contamination. Since this process requires no welding, aluminum and dissimilar metals can be used in filter designs. These units are designed for all types of filtration including oil, fuel, or pneumatic systems. *Purolator Products, Inc.*

Circle 56 on postcard for more data

Miniature Valve

A miniature valve, capable of doing the work of a valve many times its size, has been introduced. This valve can be interchangeably used on pneumatic, hydraulic, or



vacuum systems. The valves are said to have multiple uses in the machine tool, aircraft, missile, and automotive fields. Three sizes will be manufactured by the *Gabriel Co.*

Circle 57 on postcard for more data



Revolutionary tire hugs the road so well you can't make it screech!

BIGGEST TIRE NEWS IN 25 YEARS...TIRES OF BUTYL RUBBER

BUYERS REPORT PERFORMANCE OF THESE NEW TIRES EXCEEDS ALL EXPECTATIONS

Today, thousands of passenger car owners are finding that tires made of Enjay Butyl bring new comfort, silence and safety to their driving.

Here's what they say: "makes an unbelievable difference," "give you a feeling you're riding on a cloud," "... are absolutely quiet ... over bumpy dividers you don't feel a thing," "have much more stopping power on wet roads than any other tire I've used."

Proof of the Butyl tire's popular acceptance is the fact that 82% of those sold are sold in sets of four.

ONLY TIRES OF BUTYL RUBBER OFFER ALL THESE ADVANTAGES

Quieter Ride — Butyl tires will not screech in cornering at any speed. Running noise and vibration are measurably reduced.

Safer Ride — Butyl tires stop up to 30% faster than ordinary tires ... stop faster on wet pavements than others do on dry.

Smoother Ride — Tires of Butyl tend to flow over road irregularities. Their shock-absorbent ride practically eliminates road-seam thumping.

Revolutionary Tread Design — Grooves are minimized, putting more rubber on the road for greater stability and traction.

Tires made of Butyl rubber provide extra sales points for new cars. Each outstanding advantage of this miracle tire is easily and factually demonstrated for quick customer acceptance.

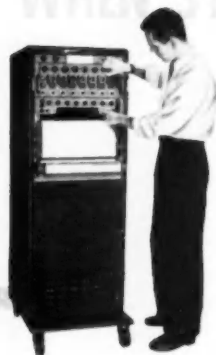
The Enjay Company does not make tires. It supplies Butyl rubber to manufacturers of tires, tubes and hundreds of other products.

EXCITING
NEW
PRODUCTS
THROUGH
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Complete details are available from Sanborn Sales-Engineering Representatives located in principal cities throughout the U.S., Canada and foreign countries.

SPECIFICATIONS

INPUT	100,000 ohms, all ranges, floating and guarded.
OUTPUT	400 ma. full scale, 15 ohms nominal load, ungrounded
LINEARITY	$\pm 0.4\%$
SENSITIVITY	10, 20, 50, 100, 200, 500, 1000 and 2000 uv per chart div
COMMON MODE REJECTION	100 db, min. dc
FREQUENCY RESPONSE	0-100 cps within 3 db at 10 div peak to peak. 0-50 cps within 3 db at 50 div peak to peak.
NOISE	$\frac{1}{2}$ div peak to peak maximum.

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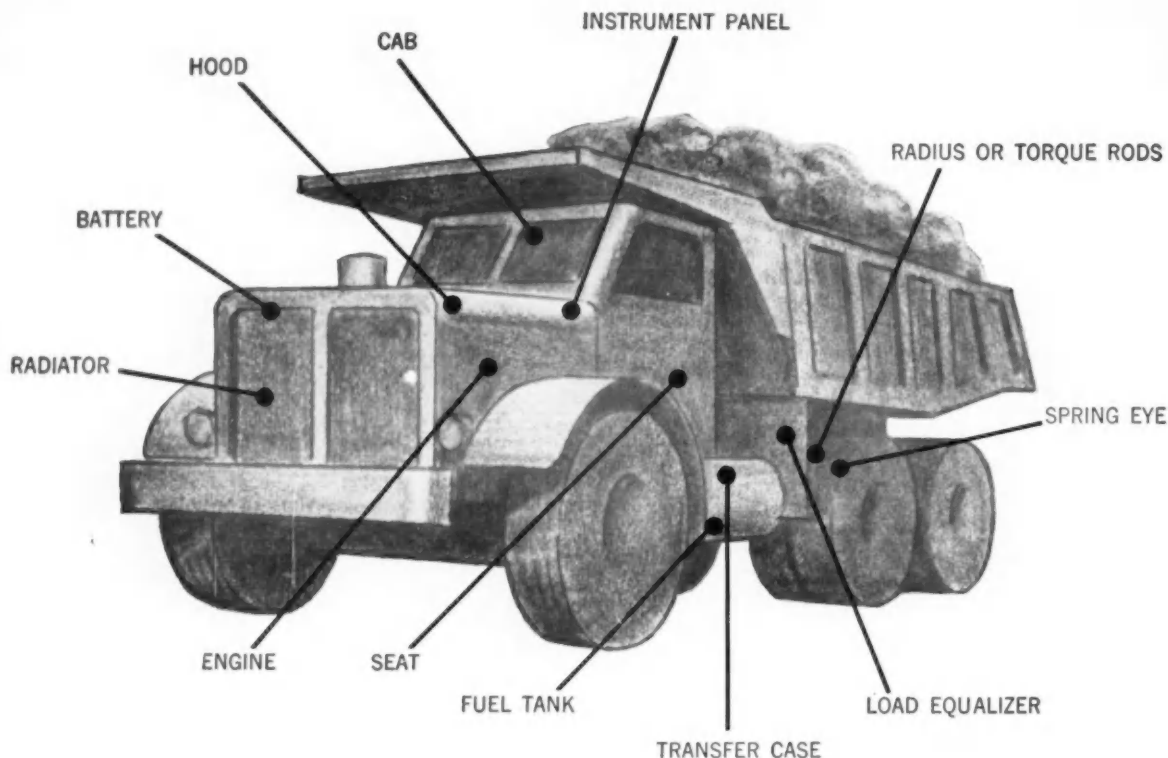


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News of the MACHINERY INDUSTRIES

By Charles A. Weinert

European Manufacturing Techniques Among Topics at 35th Annual Meeting of AMTDA. Latest Controls Discussed at Annual Machine Tool Conference of the AIEE

Distributors' Annual Meeting a Huge Success

Headed by a lively and well-planned program, members and guests of the American Machine Tool Distributors' Association convened late last month for one of the most successful meetings in that organization's history. Staged at St. Louis, Mo., on October 25-27, the event was the 35th Annual Meeting of the Association. Attendance totaled about 350, including some 75 builder company representatives and other guests.

Most of the machine tool industry's pressing needs or problems—sales trends, foreign competition, international trade, depreciation, better selling methods, increasing sales costs, financing the order, among others—came up for discussion. Some of this took place in very stimulating "off-the-record" sessions, where everyone could speak freely. Others of the subjects were thoroughly covered in the formal presentations. Needless to say, this meeting report will be confined to highlights of the general sessions.

The observations of one machine tool distributor during a recent trip abroad were presented by the opening speaker on the program. He was none other than James O. Ellison, 1958-9 president of AMTDA and president of Harron, Rickard & McCone Co. of Northern Calif.

Paris Machine Tool Show

During his trip, the speaker spent a full week in September at the Paris Machine Tool Show. The show was big, both in area and number of machines displayed, and

of considerable interest. However, he did not feel it was as well attended as it might have been, nor did he see "as much that was really significantly new in the art of metalworking" as he had anticipated.

Numerically - controlled equipment was not particularly emphasized, and the several systems represented in the display were of types less "dramatic" than those offered by American builders.

In the speaker's view, the equipment which received the most visitor attention was an automated line "which was producing tapered roller bearing races from bar stock slugs through the medium of an induction furnace, three press stages in a mechanical press, and two rolling stages on an automatic ring mill."

Another interesting exhibit consisted of "a two-spindle vertical milling and drilling machine which was equipped with two automatic tool changers, one of which was placing milling tools in and out of a milling spindle and the other placing drilling and reaming tools, etc. in a drilling spindle." This machine had a two-coordinate tape-controlled table.

Much emphasis, he commented, was placed on production-type shaft-turning machines, quite a number of which were equipped with automatic loading and unloading devices.

After attending the Show, Mr. Ellison visited several machine tool plants in Holland, Germany, and England. He found many of these plants running at or near capacity,

and that their booming business was coming from Russia and Red China in addition to Free Europe. Further, that European automobile and appliance makers have been ordering special machinery at a high rate, and that this business added to the business from Russia and Red China has some of the builders largely engaged in this type of work—rather than on general-purpose machines.

European Production Methods

Again stressing these were his observations, and that there were "two sides to the story," Mr. Ellison opined that the superior manufacturing techniques often credited to European builders were not justified. He said he "did not see any instances of ultra precision or radical departures from the techniques used in America." Also, material handling equipment is not being employed to the extent it is in America, handling mostly being done manually. He observed, further, that less precautions are taken to insure cleanliness of precision parts during manufacture. Common practice is to place workpieces on the floor to one side of the operator to be picked up by hand, processed, and then placed on the floor to the other side of the operator, in progressing through various machining and assembly operations.

The speaker was highly complimentary of the apprenticeship training programs in effect abroad, and said that "if there is anything we could ever bring home with us from the European builders," this was the top item in his book.

(Continued on next page)

News of the MACHINERY INDUSTRIES

(Continued from page 97)

Major Factor

In summary, Mr. Ellison expressed the opinion that the distributors as a group should be mainly concerned with the "underlying reasons why our machine tool industry is operating at a mere fraction of its capacity, when our European contemporaries are enjoying a virtual boom." He said many of the causes are complex and beyond the realm of the machine tool industry as such—but that it is basically a major problem of "what must be done to get American industry back into step internationally in the use of new machine tools." Otherwise, if the level of demand is not substantially stepped up "we shall have to become accustomed to being internationally a third-rate builder and user of machine tools."

Financing

"Financing the Order" was the topic of an extremely interesting and enlightening panel discussion moderated by T. Laurence Strimble, president of National Acme Co. Panel members were D. P. Boothe, Jr., president of Boothe Leasing Corp.; Frank K. Griesinger, assistant treasurer of Lincoln Electric Co.; and Robert J. McCullough, assistant cashier of The First National Bank, Chicago. Various methods for financing the purchase of new machine tools were discussed, including conditional sales contracts, builder financing, and leasing.

The comments of the panel members left the impression that no one of the methods available was universally advantageous — and that all should be carefully considered in each case before making a final selection. A particular method may be best for a given purchase, yet not offer in another instance the desired features of one of the alternative methods. Leasing — the most recent of the options — apparently costs more, yet has very favorable attributes for certain

types of equipment applications. It was stressed that no user should expect a more favorable tax position with leasing.

Overall, financing by any method was said to be a valuable sales tool — and also one which can offer the customer a means which will make more for him in operating economies than it costs him to finance the order. Add this to the fact that equipment prices in the future are very likely to increase dollar-wise, further extends the potential attractiveness of modernizing ma-

chine tool equipment by financing at present-day price levels.

New Officers

During the meeting, election of new officers for the forthcoming Association year took place. New **President** is J. Russell Clark, president of White Star Machinery & Supply Co., Inc., Wichita, Kansas. Other new officers are: **Vice-President** — George E. Merryweather, president and treasurer of Merryweather - Strasmann Machinery Corp., San Mateo, Calif.; **2nd Vice-President** — I. B. Rabel, president of Star Machinery Co., Seattle, Wash.; and **Secretary-Treasurer** — C. D. Day, vice-president of Machinery Associates, Inc., Wynnewood, Pa.

Latest Control Developments Aired at AIEE's Annual Machine Tool Conference

Numerous machine tool controls and electrical components were explored at the 11th Annual Machine Tool Conference of the American Institute of Electrical Engineers. Product developments included a variety of new electric motors, adjustable - speed drives, limit switches, sealed miniature relays, and static control units.

Held this year in Cleveland, on October 19-21, the conference was attended by more than 550 representatives from the machine tool, automotive, electrical, and associated industries. Walter K. Bailey, president of Warner & Swasey Co., presented the opening address.

On the three-day program were 11 full-time technical presentations. Other features were eight five-minute and three 10-minute talks on recently-developed products and systems. Three tours to local manufacturing and machine tool plants also were part of the large, interesting agenda.

Subjects of the technical papers, in addition to those relating to product developments, were: Flow-turning applications, a new numerical-control programming system, operating experience with static controls, statistical methods application to machine tool manufacture, and "a 10-year look into the

future for machining." Among the control systems described were a photoelectric safety device for presses, and an ultra-precision control for infeed centerless grinding.

Auto-Prompt Programming

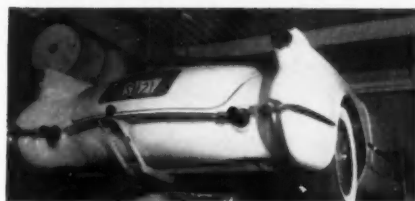
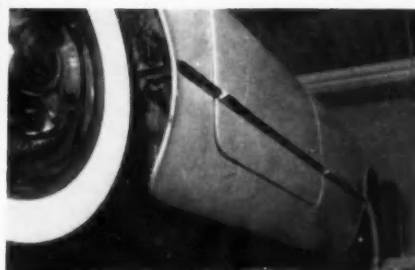
Introduction to a brand new system for programming numerically-controlled machine tools was made by Samuel M. Matsa of the Data Systems Div., International Business Machines Corp. Called Auto-Prompt, after the full terminology of AUTOMATIC PROgramming of Machine Tools, it is a basic three-dimensional system for describing and handling the machining of complex shapes.

In a manner similar to, but extended beyond, the APT system (see AI for April 1, 1959, page 42), Auto-Prompt gives instructions to the computer in the form of abbreviated English words. These "instructions" include specification of the surfaces of the part, whether it be a plane, cone, cylinder, sphere, ellipsoid or other form—and the manner in which the portions of such surfaces are combined into specific regions of the part. In addition, the programmer supplies the methods for machining each region, feed and speed rates, and

(Turn to page 122, please)

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THERE IS NO RUST, CORROSION OR OTHER DETERIORATION OF THE MOLDED FIBER GLASS BODY.

The car hit a deer in the Pennsylvania mountains . . . right front fender. It ran into a stone fence later . . . left front fender. It has had a few scrapes with other autos. These impacts have caused only small, local damage, quickly and easily repaired. The tough impact-resistant body has never been out of shape or dented. It has been repainted once — for appearance only.

NO BODY PARTS OR SECTIONS OF BODY PARTS HAVE EVER BEEN REPLACED.

Maybe **your** products, too, could be made **better** with MOLDED FIBER GLASS. Our engineers will be glad to go over your drawings . . . call, write or send for literature.

More Government Contract Awards

LATEST contracts awarded by various Government agencies, and covering primarily automotive and aviation products, are listed in the following. Typical of the items contained in these monthly listings are: passenger cars, motor trucks, aircraft, military tanks, engines, transmissions, other components, spare parts, plant equipment, etc. This list is for the period Oct. 1st to Oct. 29th, inclusive.

BROWN & SHARPE MFG. CO., Providence, R. I.
Ultra-precision grinding machine, 1 ea—\$28,515

CINCINNATI MILLING & GRINDING MACHINES, INC., Cincinnati, Ohio
External cylindrical grinder, 4 ea—\$67,241

CINCINNATI MILLING & GRINDING MACHINES, INC., Cincinnati, Ohio
Milling machine, 7 ea—\$181,797

CLEVELAND PNEUMATIC TOOL CO., Cleveland, Ohio
Spare parts—\$113,927

CUSHMAN MOTOR WORKS, INC., Lincoln, Nebr.
Three-wheeled vehicles, 12 ea—\$24,000

DOUGLAS AIRCRAFT CO., INC., Santa Monica, Calif.
NIKE repair parts—\$174,462

EX-CELL-O CORP., Detroit, Mich.
Precision boring machine, 2 ea—\$51,190

GOODYEAR TIRE & RUBBER CO., Akron, Ohio
Wheels, nose, aircraft, 380 ea—\$43,119

KEARNEY & TRECKER CORP., Milwaukee, Wis.
Milling machines, 12 ea—\$98,544

MACHINERY ASSOCIATES, INC., Wynnewood, Pa.
Engine lathe, 3 ea—\$33,519

MACHINERY ASSOCIATES, INC., Wynnewood, Pa.
Grinding machine, 1 ea—\$27,700

MODERN MACHINERY ASSOCIATES, INC., Birmingham, Ala.
Milling machine—\$30,620

NORTH AMERICAN AVIATION, INC., Canoga Park, Calif.
Rocket engines—\$29,000

VAN NORMAN MACHINE CO., DIV. VAN NORMAN INDUSTRIES, INC., Springfield, Mass.
Milling machine, 6 ea—\$103,736

WESTERN ELECTRIC CO., New York, N. Y.
NIKE spare parts & components—\$44,874

WARNER & SWASEY CO., Cleveland, Ohio
Turret lathe, 1 ea—\$31,814

types of electrostatic systems: the pneumatic and non-pneumatic. The first depends upon atomization of paint by air; the second depends upon the electrical discharge. The pneumatic type, according to the speaker, is the only system that permits use of high metallic paints. Striking advantage of electrostatic painting is its efficiency of application which runs as high as 95 per cent, compared with about 55 per cent for conventional air spraying.

Butyl Rubber

Butyl rubber applications made dramatic gains in 1960 cars. The properties of these important formulations together with suggestions as to their utilization were described in an extensive paper presented by Cardillo, Gleason, and Hammel, of Enjay Laboratories. Among the useful applications in which butyl compounds can replace rubber are the following: sealants, bumpers, mounting gaskets, shims and fender seals, mats and pads, weatherstrips, grommets, hoses, bellows and covers, electrical wiring insulation, wiring clips and insulators.

The Falcon

The background for the development of the Falcon program from the management standpoint was pictured by C. F. Baldwin, Jr., Ford Motor Co. This was substantially the same as was given to the national press during the preview season. Noteworthy was the reiteration of the original statement that so far as the company is concerned they don't care how the market may split between small and full-sized cars. The inference is that the small cars may make larger inroads into larger cars than into the imports. And in that event Ford apparently stands ready to make any readjustments in schedules as dictated by public demand.

Plastics Applications

Potential applications of plastics as a replacement for steel were highlighted by T. H. Risk and G. M. Beuhlig of Ford Advanced car engineering. They described the conception and development of seat side shields produced from linear

(Turn to page 118, please)

Body Engineers' 14th Annual Convention

(Continued from page 73)

wider range of durable colors for aluminum decorative elements. In the future, Conlee visualizes aluminum for hardware items; also for hoods, roofs, doors, and deck lids.

Structural Adhesives

Pointing to the enormous amount of experience in the aircraft industry with structural adhesives, E. F. Hess, Minnesota Mining & Mfg. Co., suggested the possibility of using these versatile materials in automobile construction. He observed that where applicable such adhesives have basic advantages over fusion and mechanical methods of joining metals. Moreover, the adhesives can be applied by simple and practical techniques consistent with mass production requirements.

Testing of Bodies

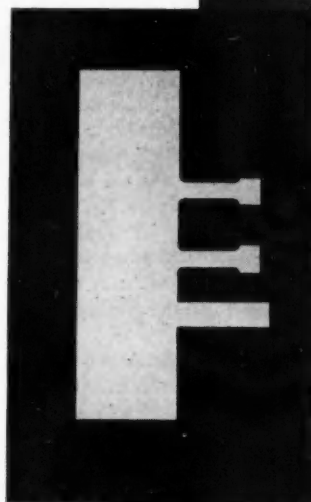
One of the sessions was devoted to electronic testing of body structures. Arthur S. Bassette, Fisher Body Div., and G. Klaasen, Chrysler Corp., presented the papers. Both papers were substantially the

same as those presented by the same authors at the SAE National Automobile Week meeting in March, 1959.

Body Finishing

Problems in body finishing and a discussion of methods were presented by Melvin C. Halstead, Fisher Body Division. In the process he supplied some interesting statistics: last year Fisher Body consumed about 4,322,000-gal of top coat; 2,155,000-gal of primer; and 5,380,000-gal of reducer and thinner. According to Halstead, electrostatic painting seems to hold the best possibilities for improving autobody painting efficiency. At present no one has attempted to spray color in production but the technique is being employed for primer surfaces.

What complicates color coating is the large variety of colors that must be handled. One manufacturer is said to be getting close to the development of an automatic color changer for electrostatic booths. Halstead described two different



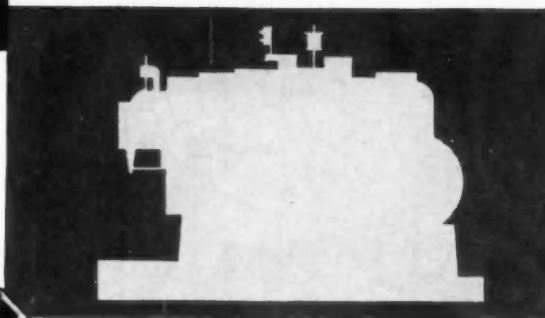
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Whether your delivery requirements are on normal or routine schedules, your design requirements complex or simple, you can save dollars and days by calling on us. We'll welcome the chance to show you how our engineering staff and diversified manufacturing plant can deliver the contacts you need . . . on time . . . at an attractive price. Just write or call.

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Radioisotopes Advance in Automotive Engineering

(Continued from page 64)

Sources

Selection of the source depends primarily on the thickness and density of the material being gaged. In general, beta gages are useful for very thin sections or very light materials—paper, plastics, cloth, foil and very thin sheet

metal, etc. Thicker sections and heavier materials require more penetrating radiation. Table II lists several isotopes together with their properties and sensitivities.

Sensitivity

Because the absorption of both

betas and gammas are exponential functions—i.e., the same thickness of a given material always absorbs the same fraction of radiation for a given isotope—all isotope gages have absolute limits of sensitivity, each a function only of the characteristic radiation and the material being measured. For example, an increase in thickness of 0.001 in. of steel in a cobalt 60 beam of gammas will always reduce the effluent radiation by the same fraction (about 0.1 per cent), regardless of the original thickness of the steel. Thus one should be able to measure a change in thickness in steel of 0.001 in. through any thickness. Heavier sections will require stronger sources to insure that sufficient radiation reaches the detector, but the absolute sensitivity is essentially independent of thickness. As a result, proper source selection can result in exceedingly high sensitivities, if desired, especially in thicker sections.

Table II gives some approximate values of absolute sensitivities. For most applications, one per cent changes can be readily measured, and 0.01 per cent is not uncommon.

Economics

The isotope gage is essentially a process control instrument. As such, its greatest value is in an area relatively easy to measure—material savings. Labor savings may be effected, especially where the gage replaces manual sampling and measurement methods, but it is in material savings where the most spectacular results are obtained.

Consider, for example, a mill producing 40,000 lb a day of material worth 50 cents a pound. Assume that the old control process held tolerances to ± 10 per cent of thickness. As much as 4000 lb of material worth \$2000 could be "lost" every day. In practice, the value might be closer to \$1000. (Although some material would be produced under target thickness, the tendency is to run high to avoid scrap.) A gage-controlled process might be assumed to hold thickness to within ± 3 per cent of target thickness. But, because of



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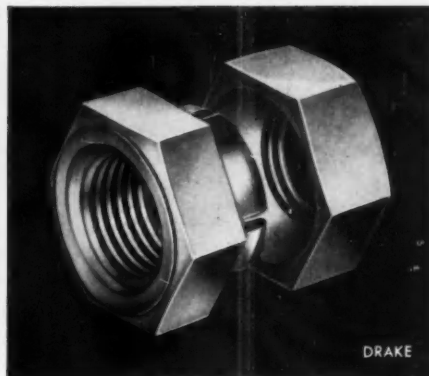
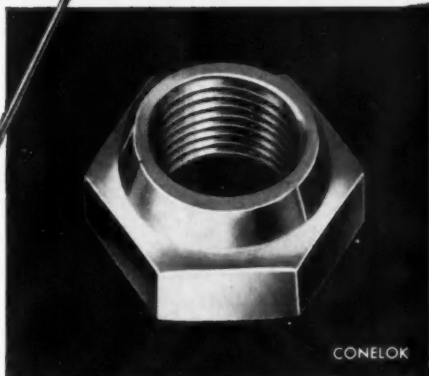
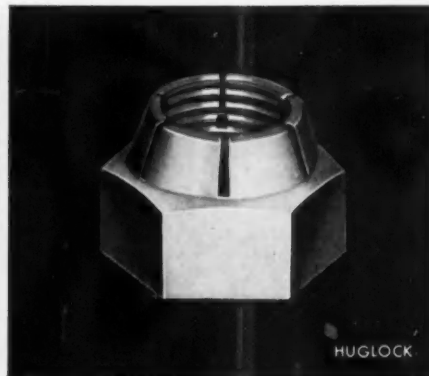
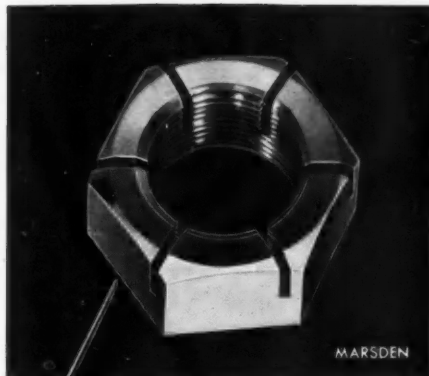
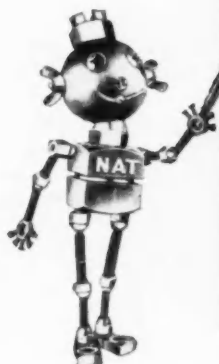
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By taking an early look at these National all-metal lock nuts, you may often be able to make quick work of finding the locking member that best meets the requirement of your particular job.

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DRAKE—For use under severe stress, shock or vibration. Free-running until seated, or can be locked at any point by using two wrenches. Two-piece design, and fully re-usable.

Take a good look at all four, and at the advantages they may be able to offer in your product assemblies. You may not be thinking of an application right now, but get the literature* and keep it handy in your files, just in case.

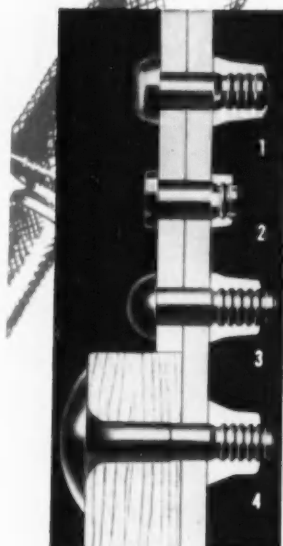
*There's a folder on the Conelok, and a booklet on the others. Write for your copies.



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- EASY REMOVAL
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- NO LOOSENING BY OVERDRIVING

Huckbolt fasteners have effected savings of as much as 70% over previously used fastening methods.

These versatile, efficient fasteners are available in diameters, grips, headstyles and metals to suit your needs.

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the tighter tolerances, and because there is no longer concern about scrap from undersized material, the average thickness for production is very nearly exactly on target. Potential savings, then, are \$1000 per day. Under these circumstances the gage will pay for itself in a relatively short time.

The example used, while oversimplified, is not a rare instance. In most applications a gage will pay for itself in well under a year—and in many cases in just a few weeks.

Applications

Approximately 5000 gages are in use in American industry today. In metal working, for measuring and controlling the thickness of: steel for automobile, bus and truck bodies; the steel from which automotive bearings and springs are made; stainless steel for automobile trim; and steel and non ferrous metals used in automobile hardware. Gages in the tire industry control ply uniformity and application of rubber to plies. Gages help make better batteries by controlling calendered rubber used in making battery separators and in controlling lead oxide pasting to lead grids to make battery plates. Coated fabrics and plastics materials for automobile upholstery are also measured and controlled with isotope gages, not to mention a host of processes in the petroleum and chemical industries whose products find their way into the automobile.

TRACERS

While radiography and gaging have found direct in-plant applications in industry, radiochemicals and tracer techniques have been restricted almost entirely to the research laboratory. The reason for this isolation lies directly in the chemical and physical form of the radioactive material as utilized. In both radiography and gaging, the radioactive material is always completely contained, hermetically sealed in metal capsules. Tracer applications, by their very nature prohibit such containment. A radiochemical tracer is of value only because its chemistry, metal-

(Turn to page 108, please)

HEAVY-DUTY

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FOR HEAVY-DUTY OFF-HIGHWAY EQUIPMENT . . .

A new concept in brake design for heavy-duty off-highway vehicles, the new Stopmaster Brake is the result of years of intensive Rockwell-Standard research and development effort. It represents the most significant brake design improvement in over thirty years.

HERE ARE SOME OF THE ADVANTAGES THE NEW STOPMASTER BRAKE OFFERS YOU!

FASTER STOPS . . . for better control

COOLER OPERATION . . . for extended brake life and durability

LESS FADE . . . for safer, continuous operation

LONGER DRUM LIFE . . . for more dependability, less down-time

GREATER INTERCHANGEABILITY . . . maximum number of common components for smaller parts inventory

LONGER LINING LIFE . . . for lower operating costs, less maintenance

LIGHTER WEIGHT . . . for heavier payloads

Another Product of...

Circle 160 on Inquiry Card for more data

ROCKWELL-STANDARD
CORPORATION

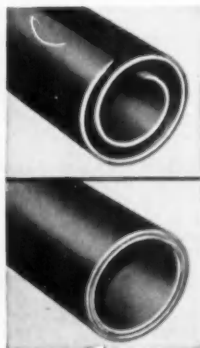


Brake Division,

Ashtabula, Ohio



There's almost no limit to the things Bundy can mass-fabricate



Bundyweld is the original tubing double-walled from a single copper-plated steel strip, metallurgically bonded through 360° of wall contact for amazing strength, versatility.

Bundyweld is lightweight, uniformly smooth, easily fabricated. It's remarkably resistant to vibration fatigue; has unusually high bursting strength. Sizes up to 3/8" O.D.

Whether it's a complex shape, or just a simple bend, Bundy knows virtually no bounds when it comes to mass-fabricating steel tubing. You see, Bundy engineers are tubing specialists . . . backed by never-ending, ever-bending experience. And here are just a few of the benefits you will derive.

From a single strip of steel comes double-walled, copper-brazed Bundyweld® tubing—leakproof by test—and the tubing standard of the automotive industry. In fact, Bundyweld steel tubing is used in many applications in 95% of today's cars.

At any stage of product development, Bundy designers can be called in for consultation, and suggestions of time- and money-saving modifications.

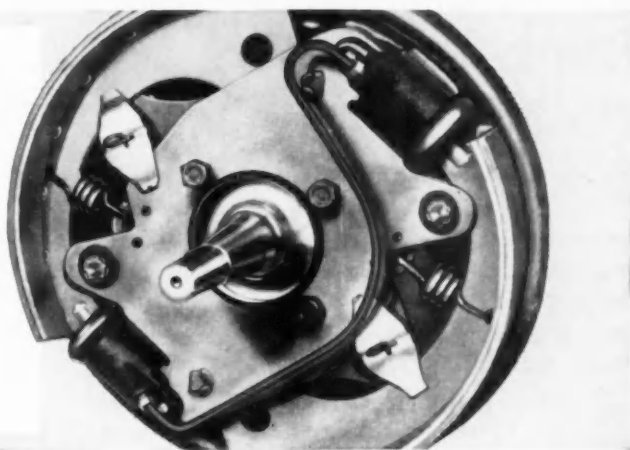
For low unit-cost and uniformly high quality, Bundy-designed fixtures and machines are geared to mass-fabricate parts to *your* specifications. Covered by Government Spec. MIL-T-3520, Type III.

Got a tubing problem? Better see Bundy *first!* Phone, write, or wire Bundy Tubing Company, Detroit 14, Michigan, today.

Circle 153 on Inquiry Card for more data



Another example of Bundy mass-fabrication. This internal hydraulic "snake" replaces mechanical brake linkage; provides safer, surer stopping. Double-walled Bundyweld steel tubing wears indefinitely; with high resistance to vibration fatigue.



There's no substitute for the original

BUNDYWELD[®] TUBING

WORLD'S LARGEST PRODUCER OF SMALL-DIAMETER TUBING • AFFILIATED PLANTS IN AUSTRALIA, BRAZIL, ENGLAND, FRANCE, GERMANY, AND ITALY

BUNDY TUBING COMPANY • DETROIT 14, MICH. • WINCHESTER, KY. • HOMETOWN, PA.

Radioisotopes

(Continued from page 104)

lurgy, and, in fact, all but its nuclear properties are identical with those of its nonradioactive counterpart. As a result, the ordinary tracer experiment results in complete contamination of the entire lot of material with radiochemicals. Quite obviously, such material could not be released for public consumption.

It is unlikely, therefore, that tracer techniques will venture very far out of the laboratory for some time. But, the results that can be accomplished, and the information that can be derived—often in no other fashion—can eventually have a very considerable impact on the economics of industry.

Principles

The basic principle of most radiotracer experiments relies on the fact that in all respects except nu-

clear, radioactive atoms are essentially identical in all their properties with stable atoms of the same chemical specie (same atomic number, or number of protons in the nucleus). Very small differences in some properties exist, but these are usually so small as not to interfere seriously with any but the most refined measurements.

For example, ordinary cobalt is cobalt 59, with 27 protons and 32 neutrons in the nucleus. Insertion of ordinary cobalt in the neutron flux of a nuclear reactor results in the conversion of a small fraction of the cobalt 59 atoms to cobalt 60 (still 27 protons, but now with 33 neutrons). Cobalt 60 is radioactive, and indicates its presence by the emission of a beta particle and two very penetrating gammas. Yet, should the irradiated cobalt be subjected to chemical or metallurgical or physical processes, both the unchanged cobalt 59 and the radioactive cobalt 60 would follow along together without serious separation or fractionation.

The principal advantage of the radiochemical is that it can be detected and measured quantitatively quickly, easily, and often without separating it from the other components of the system. It gives a constant and quantitative indication of its presence, in extremely minute quantities.

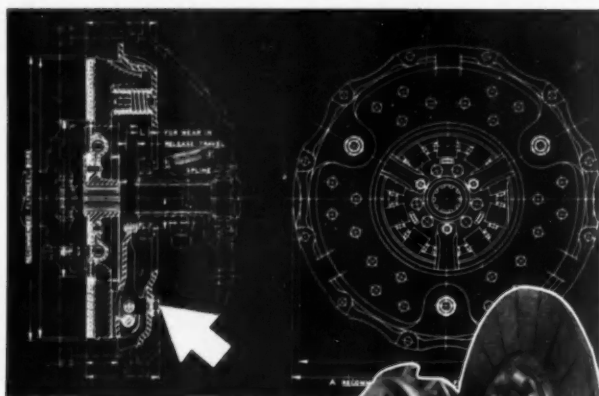
Sensitivity

Most chemical analytical methods are limited to the detection and measurement of the order of a microgram or one millionth of a gram. On the basis that 10 disintegrating atoms per second can be measured routinely with modern instrumentation, Table III gives the limits of detection and measurement for a number of radioisotopes. Sensitivities for counting radioisotopes are approximately a million times higher than chemical methods of analysis, or in the range of a trillionth of a gram. As a result, very large dilutions can be made without exceeding the limitations of the process, and very small quantities included can be measured.

Applications

A complete description of all

ROCKFORD



Genuine ROCKFORD Features Are Patented

Features of the ROCKFORD RT CLUTCH Driven Members are covered by patents and patents pending. To give your product the full advantages of these ROCKFORD developments, it is necessary to specify ROCKFORD CLUTCHES. Let our engineers help you determine the type and size clutch best suited to help improve the power transmission control in your next model.

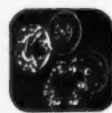
SEND FOR THIS HANDY BULLETIN
Gives dimensions, capacity tables and complete specifications. Suggests typical applications.

ROCKFORD Clutch Division BORG-WARNER

315 Catherine St., Rockford, Ill., U.S.A.

Export Sales Borg-Warner International — 36 So. Wabash, Chicago 3, Ill.

CLUTCHES



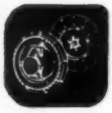
Small
Spring Loaded



Heavy Duty
Spring Loaded



Oil or Dry
Multiple Disc



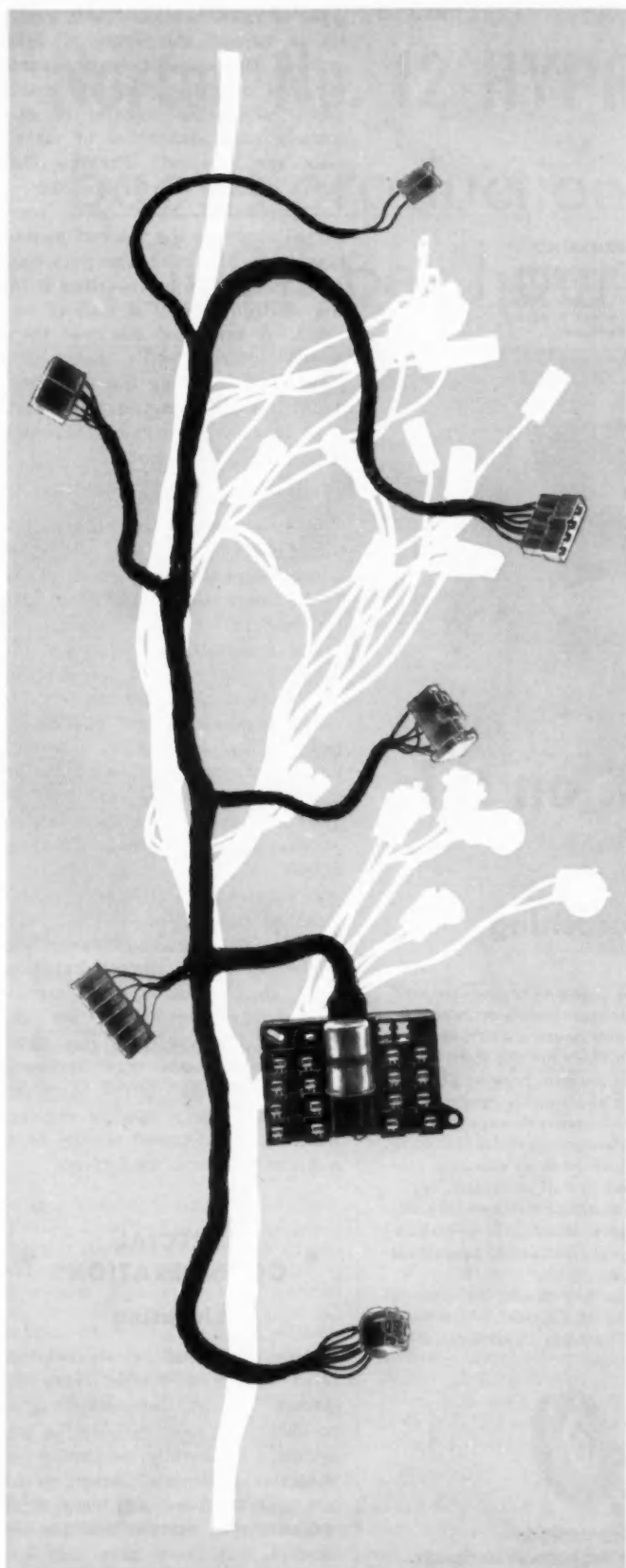
Heavy Duty
Over Center



Power
Take-Offs



Automotive
Spring Loaded



Packard Wiring Systems

SAVE ASSEMBLY OPERATIONS!

Packard Electric engineers strive continually to make their products less expensive and faster to install. Now they have made it possible for the already efficient automotive wiring harness to become an even more complete sub-assembly. • For example, the dome light of the Corvair is attached to the wiring harness at Packard and shipped ready to snap into the roof of the car along with the wiring. Single terminals are replaced by "Snap Fast" multiple connectors, fuse blocks and other cost-saving components. • If your present wiring harnesses do not include these advantages ask Packard Electric engineers to help work out modern wiring systems for you. Packard Electric, the world's largest producer of automotive wiring systems, has sales and engineering offices in Detroit and Chicago.

Packard Electric

Warren, Ohio



"Live Wire" division of General Motors



BEFORE BRUSHING

Corners of intricate multiple contours were hand-filed to remove burrs. Results were inconsistent. Former production rate: 24 per hour.



AFTER BRUSHING

All surface junctures are blended accurately to pre-determined specifications. Results are uniform...quality is high. Osborn 3-A Machine production rate: 63 per hour.

Production up 62% on this finishing job

...with OSBORN power brushing



PUSH-BUTTON FINISHING OPERATION ... with Osborn 3-A Machine using Osborn Economy Wire Brushes. Operator simply loads part... starts pre-set brushing cycle... and unloads part after brushing.

Formerly, this air conditioner manufacturer finished 24 compressor bodies per hour. He now finishes 63 per hour... a 62% increase in production. But that's just the start.

Quality now is uniform because Osborn power brushing thoroughly removes all burrs that might ultimately damage the compressor. Each surface juncture of the intricate contour is also formed to an exacting, pre-determined blend... all automatically.

Your Osborn Brushing Analyst will gladly provide complete details. He will show how you can benefit on similar operations in your own plant.

Write now for full details on Osborn Metal Finishing Machines. The Osborn Manufacturing Company, Department E-84, Cleveland 14, Ohio.



METAL FINISHING MACHINES... AND FINISHING METHODS
POWER, PAINT AND MAINTENANCE BRUSHES • FOUNDRY PRODUCTION MACHINERY

types of radiochemical tracer studies is beyond the scope of this article. However, it is pertinent to point out that they are most useful where the transfer of extremely small quantities of materials are involved. Perhaps the classic example is wear studies.

Experiments have been conducted studying the wear of piston rings, tool bits, etc. The part was made radioactive by inserting it in the neutron flux of a nuclear reactor. A series of oils was then tested quickly, easily and accurately by measuring the very tiny quantities of the radioactivity that were transferred to the oil through wear.

Costs

The cost of establishing a radiochemical laboratory can vary widely, depending on the isotopes to be used, their quantities and the nature of the experiments. Small quantities of relatively innocuous isotopes can be handled with very little more than is already available in the well equipped chemical laboratory. Counting equipment and instruments for personnel protection will be required, of course, but these can be purchased for as little as \$1000 or \$2000. More ambitious laboratories require such additional equipment as radioactive material storage facilities, glove boxes, fume hoods, shielding, remote handling tools, etc. In the extreme, a completely equipped "cave" for the handling of multicurie quantities of radiochemicals may approach the million dollar figure. Approximate costs for a specific requirement can be obtained readily from suppliers of such equipment.

SPECIAL CONSIDERATIONS

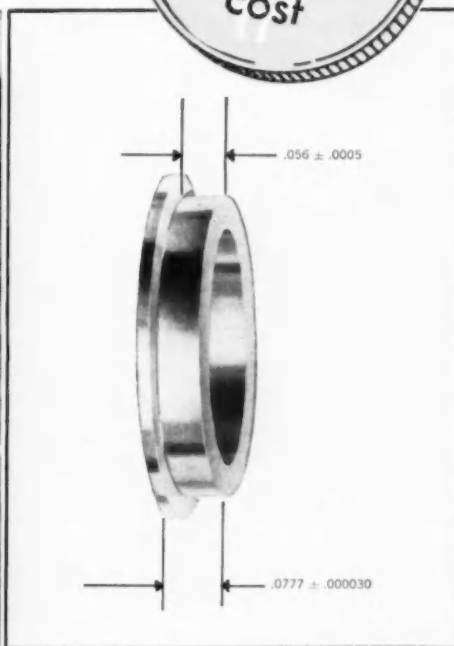
Licensing

Any individual or organization must obtain a license from the Atomic Energy Commission prior to obtaining most radioactive materials. (Naturally occurring radioactive materials, except uranium and thorium, and very small quantities of certain isotopes are exempt, but these have only spe-

BURROUGHS PLANT REPORTS:

Norton No. 12 HYPROLAP* Machine

boosts production rate 1100% per hour . . .



In the Plymouth Division of the Burroughs Corporation at Plymouth, Michigan production men recognized the productive possibilities of this NORTON #12 HYPROLAP High Production Lapping Machine and now use it to finish spacer collars at over 11 times the speed of the two surface grinders previously used. Rotating carriers bring the collar between the upper and lower laps. Work pieces are automatically fed and ejected. Besides hitting a new high in production, Burroughs also has eliminated the grading and selecting of finished pieces through the extreme productive accuracy of this advanced NORTON lapping machine.

On the #12 HYPROLAP machine the upper lap refines the surface quality of the hub face of the spacer collar, holding the .056" dimension. The lower lap finishes the flange face, producing the .0777" thickness dimension within $\pm .000030$ instead of $\pm .0001$ " as in the former method.

As proved in the Burroughs plant, the No. 12 HYPROLAP high production lapping machine offers many advantages over conventional finishing methods. Equipped with bonded abrasive laps, this parallel face flat lapping machine is available with automatic or semiautomatic continuous feed. Both arrangements provide fast lapping . . . continual operation with only occasional lap dressing . . . a wide range of selective speeds for

laps and work holders . . . finished work washed clean, eliminating extra cleaning operations.

For further details on how this combination of speed and accuracy can improve your own finishing operations, see your Norton Representative or write us direct for Catalog No. 2359-1. And remember: only Norton offers you such long experience in both grinding machines and grinding wheels to bring you the "Touch of

Gold" that helps you produce more at lower cost. NORTON COMPANY, Machine Division, Worcester 6, Massachusetts.

*Trade-Mark Reg. U. S. Pat. Off. and Foreign Countries

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cialized and limited usefulness.) Information concerning licensing requirements may be obtained from:

U. S. Atomic Energy Commission
Licensing Division
Washington 25, D. C.

In addition, most states and some cities have established codes for the storage and use of radio-isotopes. Information concerning your particular area can also be

obtained from the A.E.C. Licensing Division.

In general, the granting of a license is premised upon the adequacy of the equipment, instruments and procedures to be used, together with the knowledge and training of the responsible and participating personnel. As a rule, the best procedure is to begin by obtaining trained personnel, or, better, by training your own personnel, and then proceeding to se-

lect equipment, establish procedures, and finally, apply for the license. The best source of preliminary information is:

U. S. Atomic Energy Commission
Office of Isotope Development
Washington 25, D. C.

Training of Personnel

Over the years, the training of personnel has represented a considerable problem. Oak Ridge Institute of Nuclear Studies offers a six weeks' program. A few universities are now beginning to offer training courses. Some of the equipment manufacturers offer brief training courses and seminars aimed primarily at use and applications of their own equipment. Recently, an extensive series of one and two week training programs has become available from:

Radiation Engineered Services
Lafayette and Water Streets
Norristown, Pennsylvania ■

GMC Trucks for 1960

(Continued from page 65)

istics of the new engines, corresponding engineering developments will be found through the remainder of the power train. Throughout the series the standard clutch is designed for all ordinary types of operation but, in addition, where requirements are extra heavy such as frequent stop-and-go operations, optional heavy duty clutches of increased diameter and area are available.

Many light, medium and heavy-duty models have independent front suspensions with torsion bar springs. Light-duty models combine independent front suspension with rear coil springs.

Another version of independent front suspension is used with GMC's air suspension in companion Diesel models DLR-800 and DFR-8000. Piston-type air bellows and leveling valves at each wheel maintain constant frame height under all loads and give the cargo a soft ride.

Vari-rate rear springs, three

FOR DEPENDABLE *All Weather* COOLING



Install
EUREKA
RADIATORS

Over 30 years of specialization and engineering research have produced a radiator and core proved dependable under all conditions.

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Complete Radiators
FOR ALL
INDUSTRIAL
APPLICATIONS

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double-lock seamed give greater strength and eliminate danger of rusting
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- Large tube area for **EFFICIENT COOLING IN ALL WEATHER**, all driving conditions . . .
- **GUARANTEED**
against defects in materials and workmanship.

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EXPANDED TESTING FACILITIES TRACK DOWN TROUBLE BEFORE IT REACHES YOU OR YOUR CUSTOMERS!



GM Proving Ground, Milford, Michigan—year-around torture rack for Rochester-GM Carburetors.



GM Desert Proving Ground near Mesa, Arizona—where the heat is put on performance and economy.

Another New High in Carburetor Reliability!

Bigger and better testing traps mean more reliable performance for you and your customers. Recently Rochester-GM Carburetor testing facilities at the GM Proving Ground at Milford were doubled! Facilities at the GM Desert Proving Ground in Arizona were expanded! These extensive facilities mean Rochester-GM Carburetors are more thoroughly tested in every climatic condition—far beyond the normal limits of ordinary driving. It's just another example of the General Motors Reliability you and your customers enjoy when the cars you sell are equipped with Rochester-GM Carburetors. So keep an eye on your customer's satisfaction . . . keep a Rochester-GM Carburetor on his car. *Rochester Products Division of General Motors, Rochester, New York.*

ROCHESTER CARBURETORS



America's
number one
original equipment
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BETTER-BUILT FOR CADILLAC, BUICK, OLDSMOBILE, PONTIAC AND CHEVROLET

MACHINES ON THE MOVE...



—equipped with FAIRFIELD GEARS

GEARS to match the speed, size, and power of modern machines are a Fairfield specialty. This is possible because Fairfield is a leader in utilizing the most advanced methods, machines, and techniques for producing better gears. By specializing exclusively in "Fine Gears Made to Order", Fairfield has become one of America's largest independent producers of these parts.

If you use gears in the product you make, we believe it will pay you, as it has others, to become acquainted with FAIRFIELD—the place where fine gears are produced to meet your specifications EFFICIENTLY, ECONOMICALLY! Fairfield's production facilities are unexcelled. *Call or Write.*

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Gears and Differentials



Made to Order for:

TRACTORS • HEAVY DUTY TRUCKS • AGRICULTURAL MACHINERY • POWER SHOVELS AND CRANES
MINING MACHINES • ROAD GRADERS • BUSES • STREET SWEEPERS • INDUSTRIAL LIFT TRUCKS

inches wide, are installed on most medium and heavy-duty single rear axle models. These two-stage, progressive springs flex readily under light loads for a smooth ride, then tighten up under heavy loads.

The transmission setup of the 1960 GMC line has been greatly simplified from previous practice. Fewer gear ratios are required. Options, however, are provided for conditions requiring 4-speed, 5-speed, 10-speed, 12-speed or auxiliary transmissions. Hydra-Matic transmissions are available optionally on Series 1000 through V3500.

Frames are up to 35 per cent stronger, and are said to withstand as much as four times more twisting stress than existing designs.

Completing the basic model line-up are newly engineered four-wheel drive models, package delivery chassis in various weight brackets, and school bus chassis that include rear-engine models.

A full range of medium and heavy-duty dual drive and "pusher" axle tandems is available for 1960.

Each model can be tailored to individual operating requirements through a wide variety of optional axles, transmissions, capacity ratings, and special components.

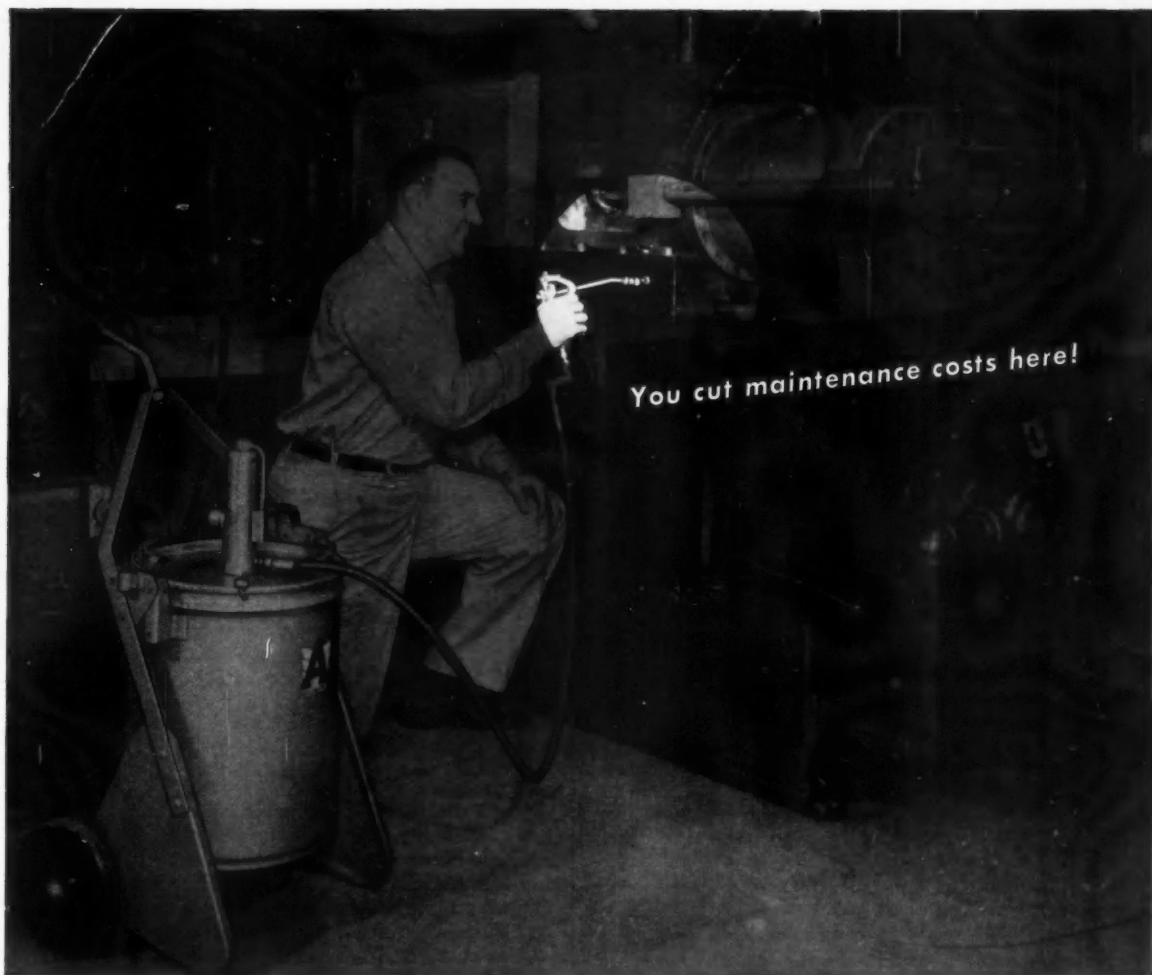
Standard throughout the line are hydraulically-actuated clutches, and improved brakes, steering geometry and electrical systems. ■

Autolite Studies Change In Toledo Setup

Electric Autolite officials will begin a series of talks with union representatives which may determine whether the corporation launches a drastic \$3 million re-vamping of its production set-up in Toledo.

John J. Bohmrich, vice president of Autolite's electrical products division—which includes the Toledo plants—has laid the problem before the company's production workers here in a series of meetings over recent months.

Autolite's present crisis in Toledo results from the loss of its Chrysler Corp. business. At a cost of more than \$35 million, Chrysler is building a new plant at Indianapolis to provide electrical systems for its vehicles.



You cut maintenance costs here!

Alemite Portable Lubricator Saves 95 Man-Hours For Every Drum of Lubricant Applied!

Every point of lubrication in your plant can cost you needless time and money if you use old-fashioned hand lubrication methods!

With this Alemite portable air-powered lubricator, you save 95 man hours for every 400-lb. drum of lubricant applied. Over two weeks of one man's time saved.

That's how you can cut maintenance costs with Alemite.

In addition, Alemite's Model "711-A" is so compact and portable that it can bring clean, waste-free lubrication to *any* machine—*anywhere* in your plant—reducing machine downtime and prolonging machine life. Its pivot-swing dolly

holds container upright at any pulling angle for easy moving over rough ground, indoors over rough floors, even up and down steps!

Step up to fast-moving, time-saving lubrication methods! Check Alemite's complete line of air-powered and electric-powered lubrication equipment for industry.



ALEMITE
DIVISION
STEWART-WARNER
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REEVECOTE COATED FABRICS

designed for the automotive industry
withstand gasoline

- *flexible*
- *heat resistant*
- *high tensile strength*
- *oil, additive and aromatic resistant*
- *abrasion resistant*

The Reevecote coated fabrics for the automotive industry have been designed and developed in collaboration with automotive engineers. The Reevecote line of natural and synthetic rubber coatings on a variety of fabrics is the most complete source of coated materials available to the industry today. Among the many uses for Reevecote are:

Air seals	Vacuum booster diaphragms
Cable wrapping	Bearing seals
Fuel containers	Carburetor diaphragms
Transmission seals	Fuel pump diaphragms
Gaskets	Vacuum pump diaphragms
Vapor barriers	Insulation
Pulsator diaphragms	Transmission modulators

Full research and development facilities are available for new applications, backed by the skills and knowledge of fabrics and coatings that only Reeves Vulcan can supply. Whatever your requirements, specify Reevecote and be sure.

Another

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**ON OUR
WASHINGTON WIRE**

Treasury Secretary Anderson is learning that the U. S. actually has few friends around the globe. Sarcastic rebuffs greeted his recent suggestion that prosperous Western Europe help the U. S. share the burden of financing underdeveloped areas of the non-Communist world.

Launching some space probes mostly for propaganda is suggested by one Pentagon executive. Roy W. Johnson, chief of the Advanced Research Projects Agency, tells why he proposes this: Present U. S. space research can be justified on grounds of military or scientific necessity. But maybe the U. S. also should compete for world popularity by setting up a program to be run without regard to military or scientific needs.

More shakeups and consolidations are in prospect for this country's missile and space program. Up-roar is caused by the resignation of Maj. Gen. John B. Medaris as chief of the Army's missile command and sharp criticism by top missileman Dr. Wernher von Braun of wasted effort and lack of direction in U. S. research. Result is likely to be more unification of the 100-odd civilian and military missile and space agencies.

Air Force Brass is getting ready for expected cuts next year in its budget for manned aircraft. So far, the Air Force has cut its authorized manpower strength by 20,000 men, to 825,000, and has shut down one air base and inactivated an entire 75-plane jet fighter wing. The moves reflect "increasing numbers of missile units and decreasing numbers of aircraft units."

Fact-finding boards in wage disputes are to be called into play more often in future nationwide strikes. Despite the recent inability of steel companies and the steel union to reach agreement via a Washington fact-finding board, Federal officials now believe such boards should be tried more often in the future.

As tools for bringing disputing parties together, Eisenhower Administration officials now believe such boards stand a better-than-average chance of inducing settlement. At the same time, it is believed that the boards can do no harm to labor and management positions, as the boards lack power to arbitrate or to impose terms of strike settlement.



Men who know best put their O.K. on
DOLE THERMOSTATS

Year after year more and more automotive manufacturers choose Dole. Today, Dole Thermostats are standard equipment on 38 makes of passenger cars, trucks, tractors, commercial vehicles, industrial and marine engines. This includes 19 out of 20 top passenger cars*.

Dole has earned this position of leadership through their never-ending program

of research and development and their constant adherence to the highest standards of quality in engineering and manufacturing. Dole Thermostats have passed every test for accuracy and dependability under all operating conditions.

So . . . it's no wonder that men who know best put their O.K. on Dole Thermostats. It's just good common sense.

*As listed in Automotive News.

CONTROL WITH

DOLE®

THE DOLE VALVE COMPANY 6201 OAKTON STREET, MORTON GROVE, ILLINOIS (Chicago Suburb)

Body Engineers' 14th Annual Convention

(Continued from page 100)

polyethylene by injection molding. Side shields for 1960 cars resulted from a 10-month crash program. The advantages of the linear polyethylene part as compared with painted steel stampings was given as follows:

Plastic parts run about $\frac{1}{2}$ the cost of steel; and tooling cost is about $\frac{1}{2}$ that for a comparable steel stamping.

Due to injection molding it was feasible to make the plastic shield part grained and part smooth with design detailed grooves in crisp relief. The effect is more pleasing than could be produced in a painted stamping.

The plastic parts effected a weight saving of 2.8-lb per car.

Because both graining and color are an integral part of the material, scuff resistance is far superior to a painted steel part. In addition, the plastic parts showed practically no dent marks in the temperature range of minus 20F to 200F, although the steel parts were noticeably dented by the same impact force.

Five double-cavity production molds now are being readied to mold the parts in vertical rather than horizontal position. Two parts, one right and one left hand, are molded simultaneously in an HPM 32-cz machine. Combined weight of the parts is 17-18-oz.

Androform Process

An explanation of the Androform Process for forming compound curved body panels without draw dies was given by Frohman Anderson of the Androform Corp. This technique, employing a unique horizontal forming machine, differs radically from conventional press operations. Instead of a die set for each stamping, the process employs "forming elements" which are universally adjustable within limits, permitting a large variety of shapes to be formed with one set of tools. Contours are formed by pulling the sheet with one set of grip-

ping jaws through a first stage, composed of fixed forming elements in one plane; then through a second stage of curved forming elements preadjusted to the required contour. The formation of the blank depends upon the distance between the two stages as well as how they are arranged—either above or below one another. These relationships are predetermined and programmed into the machine. Up to now programming has been of hydraulic tracer type but work is under way to program by means of magnetic tape.

Among the major advantages of the process are said to be:

Less power required for operating the machine.

Roller leveling is eliminated.

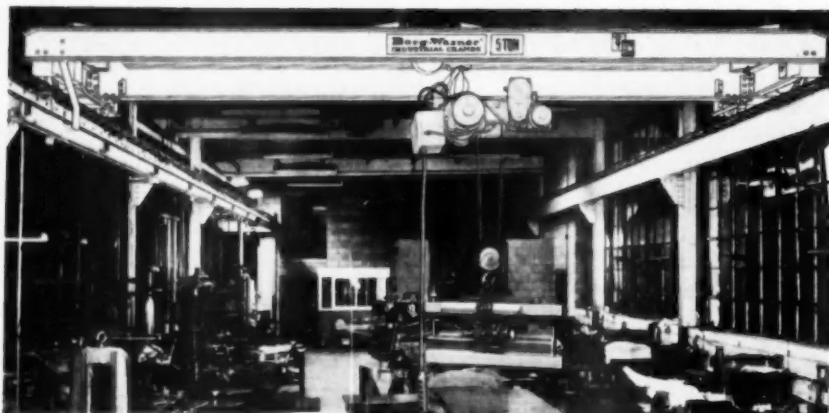
The cost of square shearing or blanking is eliminated.

Blank size is reduced considerably since no blankholder is employed.

Makes possible the use of lighter gages since the process forms with inherent stiffness and resiliency. ■

PRODUCTION WISE and COST CONSCIOUS!

Borg-Warner quality assures you of top value in every capacity, performance and price range



\$4900.00

for a 5-Ton, 22 Ft. Span, Top Running Single Girder, Motor Driven Crane complete with a 2-motor heavy duty double reeved hoist.

PRODUCTION WISE ... There's no room in this busy shop for aisle-filling floor-type handling equipment. But, an economical B-W 5-Ton Crane System moves materials and work swiftly, smoothly and quietly without interference to production.

COST CONSCIOUS ... B-W Industrial Crane's use of standardized, interchangeable components means real savings for you. You get more crane, more performance and greater dependability for a smaller investment.



Design it better ... Make it better.

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Dependable Quality


- Full 5-Ton rating.
- B-W Motor Reducer Bridge Drive with integral fluid coupling.
- Heavy duty double reeved hoist.
- Heavy duty forged steel wheels.
- Jig bored, jig assembled end trucks.
- Long life precision bearings.
- Girders and end trucks assembled with fitted bolts in reamed holes.
- Machinery girder construction.
- Full magnetic push button control.

Advanced Design

A typical B-W Top Running Single Girder Motor Driven crane is illustrated. Consult with Borg-Warner Industrial Cranes engineers for the precise equipment to meet your need.

For the deepest draws on the toughest metals

- Johnson's 700 WAX-DRAW does every draw in the shop. *Easy to apply* by roller coating, spraying, dipping, etc. Use wet or dry. Blanks can be fed directly into the press or may be pre-coated, dried and palletized. *Easy to remove*, using solvent bath, vapor degreaser, alkaline washer or even hot water alone. *Money saving*. One gallon undiluted covers 2,000 square feet. Four-to-one dilutions produce excellent results. 700 Wax Draw handles multiple draws with only one application even at pressures to 200,000 p.s.i. and temperatures to 450°F.

For further information write: **JOHNSON'S WAX**  Racine, Wisconsin, Dept. AI-1115

Another great metalworking product from Johnson's Wax Service Products Division

700

wax-draw.

Binks Airless spraying outfits are available for pumping paints direct from 55- or 10-gallon shipping containers to spray guns.



Facts

you should know about

Airless spraying

Q: Is airless atomization spraying the answer to all spray painting and coating problems?

A: No! Not by a long shot.

Q: Where, then, is airless spraying best used?

A: It is excellent for indoor and outdoor painting maintenance or production work because there is virtually no overspray.

Q: Does Binks manufacture airless spraying equipment?

A: Yes. These rugged, dependable and mobile outfits incorporate the latest developments.

Q: Why see Binks first when thinking of airless equipment?

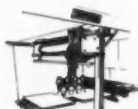
A: Binks offers you a complete line of spraying equipment. Only Binks offers you the opportunity to objectively compare airless with other techniques to select the equipment best suited to your requirements. Binks engineering assistance on finishing problems is likewise completely objective.

Q: How can more facts be obtained on Binks airless units?

A: Ask your Binks industrial distributor for Binks Bulletin A98-7. Or, call your nearest Binks Branch Office or write direct.



SPRAY GUNS



AUTOMATIC EQUIPMENT



ELECTROSTATIC EQUIPMENT

Binks Manufacturing Company

3120-30 Carroll Avenue West, Chicago 12, Illinois

REPRESENTATIVES IN PRINCIPAL U.S. & CANADIAN CITIES • SEE YOUR CLASSIFIED DIRECTORY



Registrations of new vehicles in West Germany were 888,000 in 1958, 13 per cent higher than in 1957. Following the trend of previous years, the registration of passenger cars increased, motor-cycles declined.

The new commercial jet aircraft are important users of nickel alloys—the engines for instance, use at least three times as much nickel as piston engines.

A steel company reports that an open hearth shop casting \$10 million in 1930 would cost about \$64 million today, an example of the soaring cost of the steel industry's capital improvement program.

Some 42 billion steel "tin" cans are made annually in the U. S., an average of 860 cans per family.

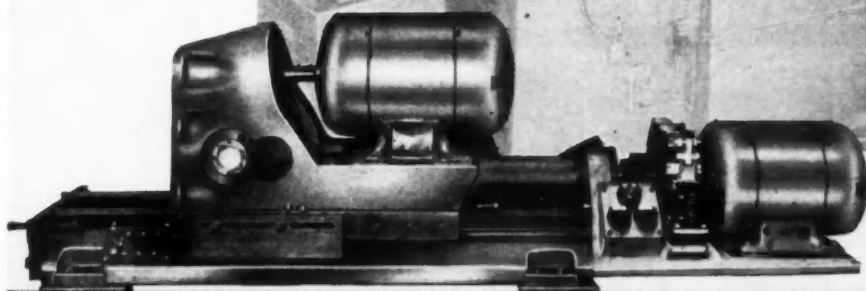
USAF's ballistic missile programs are supported by an aerospace industry team of more than 100,000 people of whom one out of every seven is a scientist or a technical expert. Annual expenditures for these projects are about \$2 billion.

The missiles one interceptor can carry today cost more than the price of an interceptor plane 15 years ago.

In 1952, about 12 per cent of all employees in the major aircraft companies were engineers. Today, approximately 22 per cent are engineers, and it is estimated that this will increase to about 28 per cent in the next five years.

HEAD and SHOULDERS OVER OTHER POWER UNITS...

the BAUSH "S" Type
mechanical Leadscrew unit
gives you more !!



A TIME SAVER WITHIN ITSELF...

Complete within itself, it can be mounted in practically ANY position, and gives you an extremely flexible feed to any rate desired... 1" to 50" per minute.

Unexcelled for operating simplicity it is readily adaptable to individual drives for 2-Way, 3-Way, or multiple automatic transfer lines, where drilling, boring, reaming, tapping, etc., operations are required. Mechanisms have hardened and ground ways — an 18" stroke with rapid traverse of 7 1/2 inches per second, has leadscrew and nut held by static capacity 75 foot pound shear brake. Motors for spindle drives are 7 1/2 HP @ 1800 RPM — 5 HP @ 1200 RPM — 3 HP @ 900 RPM. Rapid traverse motor is 1 HP @ 900 RPM. Jump in feed stroke, or dwell at end of feed stroke, can be incorporated.

SPECIFY BAUSH "S" TYPE MECHANICAL LEADSCREW POWER UNITS ON EVERY MACHINE TOOL YOU PURCHASE — YOU'LL SAVE DOLLARS AND HOURS OF MAINTENANCE.

OTHER MONEY SAVING FEATURES

- Less down time — with easy economical maintenance by shop mechanics
- Longer life of motors, gears, spindles, and guide bushings
- Positive, steady tool feed
- No surge or tool breakage in break-thru
- Interchangeability of units
- No costly hydraulic fluids
- No time-killing hydraulic leaks
- Operator starts work immediately — no waiting for warm-ups



BAUSH
MACHINE TOOL CO.
SPRINGFIELD 7, MASSACHUSETTS

News of the MACHINERY INDUSTRIES

(Continued from page 98)

similar physical instructions. With this data the computer then translates the surface definitions and the required curves of tool travel, as well as the machining instructions suitable for the particular machine which is to be used on the work. Thus, an entire "region" (as contrasted to a single bound-

ary) may be specified in one operation, with a considerable saving in programming time.

As expressed in a more simplified manner, pre-APT systems require a source program written in a rigid code and a special sub-program for each curve. APT uses English-like statements, and pro-

vides a generalized program for all types of curves. While Auto-Prompt likewise uses English-like statements, but additionally provides a generalized program for all types of surfaces.

The Auto-Prompt system, as mentioned above, is brand new. As a matter of fact, the author of the presentation indicated it was still under development and refinement, and probably would not be ready for about a year.

Electric Motors

Several motor developments received attention during the technical sessions.

One unusual d-c design, described by R. P. Burr of Circuit Research Co., has a disk armature about 0.030 in. thick, on which is carried printed - circuit - type conductors. Armature weight is said to be about one-eighth that of a conventional unit, and potential production cost of the motor also considerably less. This motor design likewise is still in the development stages insofar as manufacturing techniques and design options are concerned.

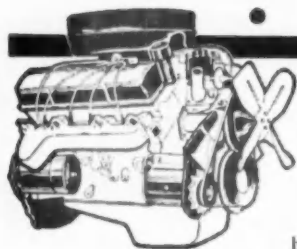
The "Syncro-Spede" motor, a relatively-new development, was the subject of a paper presented by W. E. Eichelberger, Louis-Allis Co. It was primarily developed as a synchronous wheelhead drive motor for grinders to provide constant speed under varying loads.

Another interesting motor development was discussed by S. Noodleman of B. A. Wesche Electric Co. He talked about motor designs which will step and position in, for example, 30 deg of one revolution—and then can be caused to rotate by changing the pattern of voltages supplied to the motor. The speaker said that a number of these motors can be operated from the same power supply—and when stopped, will lock together in position.

Limit Switches

An adjustable rotating-cam-operated limit switch was described by F. L. Fisher, Allen-Bradley Co. This device makes use of a planetary gear system, with drive to the sun gear. The cam is carried on
(Turn to page 126, please)

JOHNSON *tappets*



**for all engine applications*

All of the engineering and manufacturing effort at Johnson Products goes into producing a better tappet. Continual experimentation and exacting quality control make JOHNSON TAPPETS worthy of your consideration. Only proven materials, covering a range of hardenable iron, steel, and chilled iron of various alloys, are used in JOHNSON TAPPETS. These tappets are successfully used in jobs ranging from light duty to the most severe, punishing applications. Serving all industry that employs internal combustion engines.



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MUSKEGON, inc. MICHIGAN

NOW—a New Temperature Sensitive EATON VISCO-DRIVE

**—a Thermostatically Controlled Fan Drive that Increases
Usable Horsepower and Reduces Fan Noise**



WHEN COOLING IS NOT REQUIRED: The fan idles when under-hood temperature is below the thermostatic setting. The slide-valve is closed preventing fluid from entering the viscous-drive chamber.

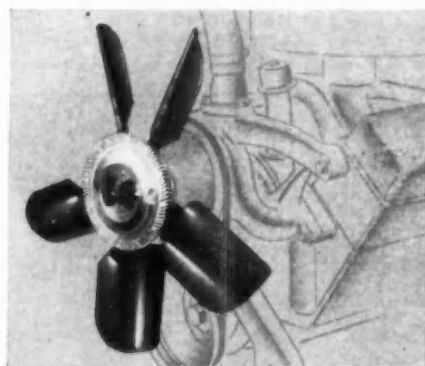


WHEN COOLING IS REQUIRED: Fan speed increases with rise in under-hood temperature. Thermostatically controlled slide-valve regulates the amount of fluid entering the drive chamber, increasing fan rpm accordingly.

The new Eaton Visco-Drive is automatically regulated by under-hood temperature. As under-hood temperature rises, the Visco-Drive automatically increases fan rpm to produce required cooling. Operational ranges can be established to suit the requirements of each vehicle model.

Thermostatically-modulated fan operation increases net output of engine when cooling is not needed; permits designing for greater cooling efficiency at low engine speeds without the disadvantage of fan noise at high speeds.

The Eaton Visco-Drive is of simple, functional design and light-in-weight construction. Field and laboratory tests have proven its dependability for application on all types of vehicles.



Ultra-compact design makes the Visco-Drive readily adaptable to your present installation with only minor changes.



*Torque-Sensitive Eaton Visco-Drives are also Available.
Consult with Our Engineers on Your Fan Drive Needs.*

EATON — **PUMP DIVISION** —
MANUFACTURING COMPANY
9771 FRENCH ROAD • DETROIT 13, MICHIGAN

(Advertisement)



"Customereed"
components
basic to industry

ideas on "Customereed" **RUBBER PARTS**

...their design and application for improved product performance **No. 2**

8-ft. rubber-metal "sandwich" resists chewing by weather, oil and millions of vehicles

**Bonded-rubber component
assures higher accuracy,
longer operating life of
vehicle detector contact unit**

Pressure-sensitive detectors installed flush with roadway surfaces are vital factors in today's ever expanding vehicular world—are used for traffic control, toll collection, automatic door opening, etc.

A contact unit produced from molded-rubber bonded to heavy-gauge and thin-gauge metal strips serves as

an actuator in the detectors. The pressure of a vehicle passing over the contact unit mounted on a steel frame below the surface of the road puts the detector to work—initiates a count or any specific action the detector is designed to perform.

The requirements for the sandwich-like bonded-rubber component comprising the contact unit: A completely waterproof and airtight air space within the full length of the one-foot wide units produced in varying lengths of four, six, eight and ten feet; resistance to the harmful effects of constant exposure to weather, sunlight, salt, oil and tire chains; an operating life involving a minimum of many millions of crossings by all types of vehicles.

The resulting design involved an exceptionally difficult molding and bonding job. Included were combinations of hard and soft rubbers. Careful attention had to be paid to many important and minute details of production and intricate design not only to meet the customer's stringent requirements for longer operating life but also to make good on rigid PSI specifications.

Ohio Rubber's wide and varied experience in "customereing"* to unusual specifications, as well as its broad, up-to-the-minute manufacturing facilities, were both equal to the challenge—successfully met all the requirements. The bonded, molded-rubber contact units are in regular production at Ohio Rubber.

PHOTO COURTESY AUTOMATIC SIGNAL DIVISION, EASTERN INDUSTRIES, INC.



(Advertisement)

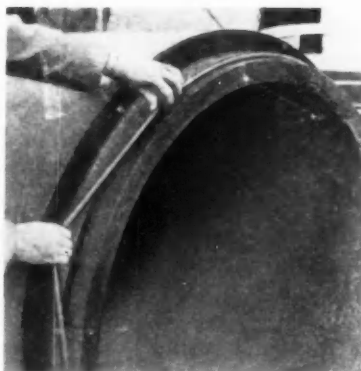


MOLDED-RUBBER TUBE STORES AND PUMPS CLEANING FLUIDS

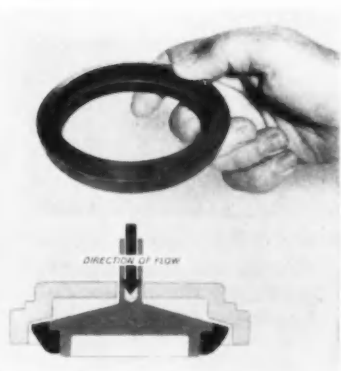
A most important part in the new Swirl-away Cleaner for walls, upholstery, woodwork, etc. is a molded-rubber tube which serves both as a secondary storage tank and vacuum pump for cleaning fluid. Unusual in shape and requirements the tube involved a complicated mold, close tolerances, and a control rate stock with particularly high resistance to harsh chemicals normally found in detergents. Problems on the design and production of this intricate rubber component were successfully worked out by engineers at Ohio Rubber where the part is now produced.

RUBBER-METAL PUMP IS KEY TO NEW DISHWASHER FEATURE

A vital component in a dual action pump which makes possible a "flush-away drain" feature in the dishwashers of a leading manufacturer, is a rubber-metal housing. Since rubber was required at several points for sealing and vibration absorption, the manufacturer asked Ohio Rubber engineers for help in designing and producing a pump housing of molded rubber bonded to a carbon-steel frame or insert. The material in the housing, which is in regular production at Ohio Rubber, also fully protects the frame from corrosive effects of both water and detergents.



Sewer-Pipe Seal—Precision extrusion of high specification rubber by ORCO provides an effective new approach for obtaining sealed or "premium joints" in sewage disposal lines—prevents surface water infiltration to reduce treatment costs. Available in a wide range of popular sizes, plus close tolerances, for concrete as well as clay pipe.



Orthane Valve Seat—Durable as the hardest steel yet resilient enough for sealing, this valve seat of molded polyurethane by ORCO is used in specialized oil field operations where it must successfully withstand the highly abrasive impact of raw crude oil mixed with gravel at pressures which often go as high as 20,000 PSI.

THERE ARE MANY MORE EXAMPLES of how Ohio Rubber "Customeered" components are helping to improve product performance for outstanding original equipment manufacturers in every industry. For more information on Ohio Rubber "Customeering"—molding, extruding, bonding-to-metal—with rubber, synthetic rubber, silicone rubber, polyurethane and flexible vinyl, write today to The Ohio Rubber Company, Willoughby, Ohio. 9DE2

* Trademarks of The Ohio Rubber Company

THE
OHIO RUBBER
COMPANY

Willoughby, Ohio

A DIVISION OF THE
EAGLE PITCHER
COMPANY

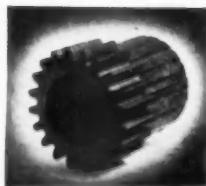


No one wants to hear the gears turning!



A TAYLOR laminated plastic gear is noiseless, acts as a safety valve in a gear train

You can solve two problems with a single gear made from TAYLOR laminated plastic silent gear stock. Noise of meshing gears can be eliminated. Damage due to destructive overloads can be localized to protect the rest of the gear train and equipment. And the laminated plastic gear will outwear metal under normal operating conditions. Look into the physical and mechanical properties of TAYLOR laminated plastic silent gear stock. It is adaptable to a wide variety of applications. Write TAYLOR FIBRE CO., Norristown 49, Pa.



Taylor

LAMINATED PLASTICS VULCANIZED FIBRE

MACHINERY NEWS

(Continued from page 122)

the rotating member; adjustment is made on the stationary member. For speeds below 50 rpm, snap-acting contacts are usually employed. Adjusting screws are provided for each contact screw. This switch was primarily developed for punch press applications, but the speaker said it was also being employed on other types of machine tools.

The operational principles of a new simplified magnetic-type proximity limit switch was the subject of a presentation by C. R. Marcum, General Equipment & Mfg. Co., Louisville, Ky. This unit has a plate-type armature/contact assembly positioned within the field of two Alnico magnets whose like poles are assembled at the same ends. One of the magnets holds the armature captive to establish a normally closed circuit. In turn, the opposite magnet normally does not provide enough force to move the armature.

Then when a piece of ferrous material moves into the sensing area adjacent to the normally closed side of the switch, this causes enough flux lines from the holding magnet to be shunted away from the armature that the biasing force of the opposite magnet becomes the larger force, thus causing the armature to snap into its other position. By the same means, the switch, later, automatically restores its original position. This unit is self-contained, and its operating parts are hermetically sealed. Sensitivity is normally set at $\frac{3}{8}$ -in.; and the switch is capable of operating up to 3600 cpm.

Centerless Grinder Control

Ultra-precision control of infeed on a centerless grinder was described in a paper given by P. Ohringer of Airborne Instruments Laboratory Div., Cutler-Hammer, Inc. Consisting, briefly, of a transducer head, an electronic control unit, a micrometer head coarse adjustment, and a power feed unit, this control is claimed to give output part size scatter on the order



it will still be as beautiful
when she grows up

UNILOY
STAINLESS STEELS

Yes . . . when she's ready to drive her own car, she too will want the long lasting beauty and protective qualities of solid stainless steel trim . . . and if this car is still around, the trim will be just as beautiful as it is today.

For stainless that offers maximum ease of fabrication and lasting, lustrous finish, specify Uniloy Stainless Steel.

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STEEL CORPORATION
BRIDGEVILLE, PA.

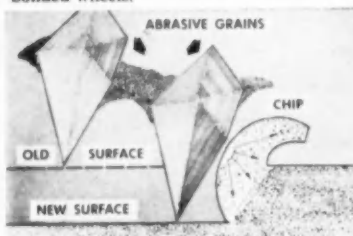
STAINLESS STEELS • TOOL STEELS • HIGH TEMPERATURE METALS

NEW WAY TO REDUCE GRINDING TIME-&-COST

Wheel was treated by dipping into KGP's new "Dri-Kool". Cost was about a dollar—RESULTS:

1. Saved \$5.40 in wheel life (wheel cost \$18).
2. Got 30% more cutting action between dressings and grinding was faster.
3. TIME SAVED ON THIS JOB, NINE MAN HOURS.

SOURCE: Time-study reports of a triple-A Detroit cutting tool manufacturer, dry grinding M-3 H. S. S. with vitrified bonded wheels.



WHAT'S BEEN HAPPENING: Localized frictional heat melts the chip. Molten metal fills the pores. The Wheel is loaded. IN DRI-KOOL TREATED WHEELS, all pore surfaces are coated with a thermal-conductive parting medium. Heat is transferred throughout the wheel, radiating off all its surfaces.

REPORTS FROM USERS SHOW: High speed steels are now being ground burn-free and burr-free for the first time... Micro-finishes are improved on hard abrasive-resistance metals... Tool manufacturers have said, "We're now able to assure our customers longer tool life."

Impregnating with KGP's DRI-KOOL takes five minutes followed by a drying period. This one treatment lasts for the life of any vitrified bonded wheel. It won't wash out—and the dynamic balance is unaffected.

TO TEST DRI-KOOL IMMEDIATELY—order one gallon (enough for six 14-inch wheels) at KGP's introductory price of \$7 (parcel post paid); or five gallons at \$30 (FOB Trenton). King Graphite Products, Inc., 21947 Telegraph Road, Trenton, Mich.

INQUIRIES INVITED from Manufacturers Agents and Industrial Distributors
Circle 175 on Inquiry Card for more data

of 100 millionths of an inch. The system is called the Bel-Air Infeed Control System, and is being marketed by the Bellows Co.

Machine Tool Sales Rebound in September

Following a drop of \$11.2 million in August from July, machine tool sales during the month of September rebounded to the extent of \$7.4 million.

Net new orders in September, according to preliminary figures released by the National Machine Tool Builders' Association, amounted to \$59.6 million. The August total was \$52.2 million, while July's figure was \$63.4 million.

Make-up of the September sales was \$48.85 million in metal-cutting-type machines and \$10.75 million in metal-forming-type machines.

The relative nine months' results on net new orders are \$480.5 million this year—up 83 per cent over the \$262.7 million last year.

Shipments during September versus August increased \$5.5 million—to \$45.8 million from \$40.3 million. For the recorded year to date, nine months' shipments amounted to \$375.85 million as against 1958's \$400.9 million.

The backlog of orders on hand as of October 1 was at the highest level of the year, being estimated at five months.

Around the Industry

Wheelabrator Corp.—has acquired Lake Erie Machinery Corp. of Buffalo, N. Y., which will operate as a wholly-owned subsidiary in continuing to make hydraulic and extrusion presses for the metalworking industries, and die casting machines and equipment for the printing industry. Elmer A. Rich, III, former general sales manager of Wheelabrator, has been named vice-president and general manager of Lake Erie.

Brown & Sharpe Mfg. Co.—John F. Hines has been appointed sales manager of the Cutting Tool Div., having recently returned from Plymouth, England where he served as B&S sales manager. ■

**AUTOMOTIVE INDUSTRIES
KEEPS YOU INFORMED**



YODER SLITTERS

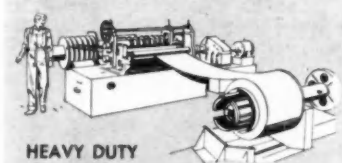
basic equipment for cost-conscious users of strip!

To help meet the demands of tight production schedules, YODER Slitters reduce mill-width stock quickly and economically to desired widths. If your needs are as low as 100 tons per month, time and manpower savings alone will offset the cost of your YODER Slitter in a matter of months, while reducing basic inventories. Compactly designed, standard YODER Slitters are built to handle standard coil widths... completely engineered lines for special requirements.

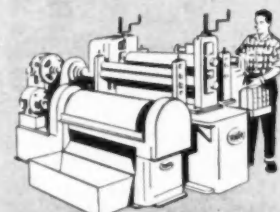
YODER accessories, such as coil cars, swivel unloaders, scrap choppers, scrap disposers, plate levelers and coil boxes, make stock handling fast and easy.

YODER also makes a complete line of Cold Roll-Forming equipment and Pipe and Tube Mills. To profit from YODER'S years of engineering and service experience, contact your local YODER representative or send for the fully illustrated descriptive, YODER Slitter Manual; it's yours for the asking. Write to

THE YODER COMPANY
5553 Walworth Ave. • Cleveland, Ohio



**HEAVY DUTY
SLITTING LINES**



SCRAP CHOPPERS



**ROTARY
SLITTING
LINES**

Circle 176 on Inquiry Card for more data

Belly-deep in abrasives!



But it can't touch her track wheel bearings

Whatever the Oliver OC-12 is bulling through . . . liquid ooze, dirt, or gale-blown desert sand . . . nothing can get into the track wheel bearings. Oliver engineers saw to that. They specified C/R Type VS End Face Seals with metal-to-metal contact to protect those bearings. The metal faces in these seals are lapped to within 3 lightbands of being optically flat. Nothing can get in . . . and the fluid lubricant inside can't get out . . . no matter how rugged the duty. Oil seal dependability like this means fewer lube checks, fewer lube changes . . . less downtime. And *that* means big savings for Oliver users.

C/R End Face Seals are performing hundreds of other critical sealing jobs . . . saving equipment, time and money. No matter what is involved . . . high speed, temperature, pressure . . . in everything from rockets and missiles to pumps, tools and washing machines . . . there's a C/R End Face Seal for the job. If it's *your* job to solve a difficult lubricant retention problem . . . share it with us. Write for detailed information on C/R End Face Seals.

More automobiles, farm and industrial machines rely on C/R Oil Seals than on any similar sealing device.

CHICAGO RAWHIDE MANUFACTURING COMPANY

OIL SEAL DIVISION: 1205 ELSTON AVENUE • CHICAGO 22, ILLINOIS

Offices in 55 principal cities. See your telephone book.

In Canada: Chicago Rawhide Mfg. Co. of Canada, Ltd., Brantford, Ontario

Export Sales: Geon International Corp., Great Neck, New York

C/R Products: C/R Shaft and End Face Seals • Sirvene (synthetic rubber) molded pliable parts • Sirvis-Conpor mechanical leather cups, packings, boots • C/R Non-metallic Gears



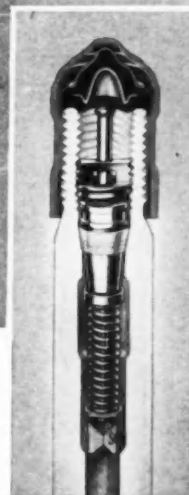
The American Automotive Industry—the world's **Complete tire-air**

Country/Region	Estimated Total Tires in Use
Canada	29,484,400
United States	443,350,412
Great Britain	37,910,500
Africa	15,133,200
Other Americas	24,986,800
Australia	16,062,600

Total tires in use estimated from current available statistics.



*Schrader's famous tire valve operating principle is the
Ace of Standardization for the vast numbers of
tires now in use in countries around the globe.*



greatest enterprise—depends on tire accomplishments service everywhere keeps vehicles rolling



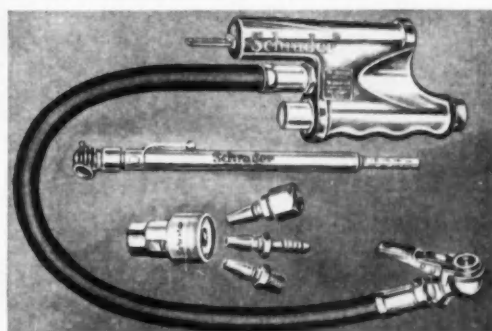
TIRE OUTLETS make tires available in quantity to all users. The right tire for the right vehicle is always available from their stocks.



TIRE REPAIR DEPOTS specialize in getting all the mileage from tires by providing vital air pressure facilities, recapping, fixing flats, replacing valves, etc.



DEALERS make tire-air service as readily available as newspapers to the millions of cars now rolling throughout the world . . . a prime automotive service.



SCHRADER SERVICE TOOLS and standard valve replacement parts are as available as tires. Tires also must be air serviced anywhere a vehicle rolls.

World-wide transportation would collapse without good tire service. Weather, rocks, and rough terrain slash at tires day-in and day-out. Only through the effective cooperation of many companies in the Automotive, Tire, and Tire Valve industries has good service been made available everywhere. For example, Schrader's job for over sixty years has been to seal air in tires with the safest, most practical valves possible to provide . . . interchangeable, low cost Caps and Cores of high quality for any tire . . . simple, time saving tools for gauging, inflating and sealing . . . up-to-date information. Depend on Schrader valve and equipment design, production and distribution to match the built-in performance of your vehicles and tires wherever they roll.

Schrader
a division of **SCOVILL**

A. SCHRADER'S SON • BROOKLYN 38, N. Y.
Division of Scovill Manufacturing Co., Inc.

FIRST NAME IN TIRE VALVES

FOR ORIGINAL EQUIPMENT AND REPLACEMENT

London Motor Show Winds Up Boom Year

(Continued from page 71)

and 3.15-in. stroke, and compression ratio of 8 to 1. Inclined overhead valves are operated by a high-level camshaft, and there are twin S. U. carburetors with separate large cylindrical air cleaners.

Drive is through a Borg Warner automatic transmission and hypoid bevel axle. Servo-assisted Dunlop disk brakes are used on all wheels.

The six-passenger body is similar to that of the six-cylinder Majestic which continues in production. The car weighs 4088 lb; and has a wheelbase of 114 in.

Armstrong Siddeley showed the Star Sapphire limousine, which is a long-wheelbase version of the sedan of the same name, and replaces the 346 model. It is powered

by the existing 243.5-cu in. engine that puts out 140 hp at 4000 rpm, and features power steering and disk front brakes, with automatic transmission available as an extra.

B.M.C.'s offering in the executive class was the Princess, which is based on Austin A99 and Wolseley 6/99 chassis components but has luxury coachwork by Vanden Plas, although the body panels follow the lines of the Corporation's Farina styling. This model has a 112-hp engine, vacuum servo-assisted disk brakes in front, and a pressure-limiting valve in the hydraulic line to the rear wheels.

Rootes raised the power of its top-bracket car by boring out its six-cylinder engine to 180.1-cu in. displacement for the Humber Super Snipe in sedan, station wagon and limousine forms. Output of the unit is increased to 129 hp at 4800 rpm, and maximum torque to 162 lb/ft at 1800. Front braking is by self-adjusting Girling disks assisted by a vacuum servo. Body styling and trim are slightly altered.

Jaguar introduced the Mark 2 as an addition to its range. This retains the basic body shell of the 2.4- and 3.4-liter models, but with slenderer window pillars and a larger glass area all around. It is powered by an enlarged 3.8-liter (231.8-cu in.) twin overhead cam engine developing 220 hp. Other changes include a rearranged front suspension geometry to raise the roll center, and a wider rear tread to improve cornering.

Among the new sports cars shown at Earls Court was the four-passenger A. C. Greyhound. It is based on a twin-tube chassis with 3-in. main members which are integrated with the square-tube body frame. External panels are aluminum, while plastic is used for a number of the interior panels for sound deadening as well as to reduce the cost of small-volume production.

The unusual form of independent rear suspension combines angled trailing links with double-jointed and splined half-shafts. Coil springs are in unit with telescopic shock absorbers. The engine is a 120.4-cu in. Bristol developing 125 hp at 5750 rpm. Front brakes em-

(Turn to page 138, please)

This Motor May be the Answer



High performance Lamb® motor for automotive wheel spinners, blower drives, etc. Frame 4 3/4 x 2 1/4

If You Want Greater Dependability for Your Motor-Driven Products

Lamb Electric is an engineering and manufacturing company, whose entire resources have been devoted for nearly half a century to the development and mass production of special application, fractional horsepower electric motors . . . and nothing else.

This is important to you if your product lacks sufficient life and dependability, if you are paying too much for electric motors, or your product is bulky or too heavy. Our unique qualifications are also important to you if you are planning a new product and want to start off with the right motor.

We invite your inquiry.

THE LAMB ELECTRIC CO. • KENT, OHIO

A Division of American Machine and Metals, Inc.

Lamb Electric

SPECIAL APPLICATION FRACTIONAL HORSEPOWER MOTORS

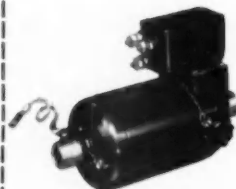
In Canada: Lamb Electric
Division of Sangamo Company Ltd.—Leaside, Ontario



Skeleton frame motor for vegetable juicer. Frame 3 1/4 x 1 3/4



Gearmotor with one stage of spiral bevel gears for portable disc sander. Frame 3 1/4 x 2 1/4



24 Volt DC aircraft motor for windshield wiper drive. Includes radio interference filter. Frame 2 1/4 x 1 1/2



Write for your copy... 8-page folder describes these and other Lamb Electric motors.

ZIP!

Off comes the can, for fast addition of the 90-lb. block of Pennsalt AE-16 S to the immersion tank.

GRIP!

Easy handling Pennsalt AE-16 S eliminates the dust and danger of other etchants.

DIP!

In the tank, AE-16 S melts without heat of solution to promote a uniform, satin-smooth etch.



New solid etchant for aluminum

non-scaling, dustless, easy to handle

Here's a brand new way to prepare etching solutions for putting a uniform satin finish on any aluminum alloy. It's Pennsalt's new AE-16S aluminum etchant . . . economically priced, and in *solid* form for easier handling and better performance.

AE-16S is supplied in 90-pound blocks, packed in light metal containers that open readily with hand tools. Add AE-16S to your immersion tank, and it melts with minimum agitation, providing a uniform concentration of alkali.

And, there's no dust, no heat of solution to upset tank temperature balance —no splatter from additions—none of the drawbacks of flake etchants. You get a clean, even etching job with AE-16S, with uniform hide. Afterwards, tank cleaning is easier, because AE-16S leaves no scale or sludge. Pennsalt's AE-16S has been field-tested by leading aluminum fabricators and producers.

New AE-16S is one result of Pennsalt's long experience and basic position in alkalis. This same experience is applied in Pennsalt service, to help you get best possible use of your metal processing materials and equipment. Write Dept. 232 or call for complete facts and figures.

... a better start for your finish[®]



PENNSALT CHEMICALS CORPORATION

East: Three Penn Center, Philadelphia 2, Pa.

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NEW 2-WAY TRIGGER RELEASE

Model 462 illustrates how only one hand easily releases clamp by pressing trigger toward either handle.

This patented feature available on many De-Sta-Co Portables.

IF YOU CAN REACH IT— A Portable Will Clamp It!

Hundreds—yes, thousands—of awkward clamping problems have been brought to us for solution in our 40 years of leadership. Many of these have been solved by De-Sta-Co Portable Clamps. You now have a selection of two dozen basic models, a variety which masters almost any conceivable portable, blind or awkward clamping operation. To add to the versatility of all our portables, there's a complete line of accessories. Features which may aid you in your next problem are

1. Two way trigger releases on numerous models
2. Deep jaws and wide spans
3. Flexi-matic and Pressure-matic spindle adjustments
4. Non-magnetic materials for the special application
5. Light weight models for continuous frequent handling

De-Sta-Co Portables lend themselves to special adaptations for that "insurmountable" problem.

Standard portables offer jaw openings $\frac{1}{2}$ " to 6", throat depths to $3\frac{1}{2}$ ", pressures from 35 lb. to 1200 lb.

Send for the De-Sta-Co catalog with details on over 130 types, sizes and models of portable and fixture clamps. We'll send you the name of our stocking distributor in your area. He is ready and qualified to assist you with your clamping problem.



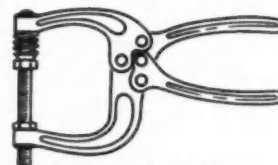
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Self-adjusting models



Deep jaw models



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1000°F.

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AM 350 and AM 355 are metals for the space age! The combination of easy fabrication with high strength-to-weight ratio of AM 350 and AM 355 interests missile and supersonic aircraft designers with problems of high strength at elevated temperatures.

This pair of precipitation hardening stainless steels from Allegheny Ludlum research are easy to fabricate in the annealed condition. They can be spun, drawn, formed, machined, brazed and welded using normal stainless procedures.

Both alloys have high strength without embrittlement from room temperature to 1000°F, plus good ductility at elevated temperatures. They have remarkable stability and excellent corrosion resistance.

AM 350 is available in sheet, strip, foil, small bars and wire. AM 355, best suited for heavier sections, is available in forgings, forging billets, plates, bars, wire, sheet and strip.

For further information, see your A-L sales engineer or write for the new technical booklet, "AM 350 and AM 355," Allegheny Ludlum Steel Corporation, Oliver Building, Pittsburgh 22, Pa.

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Doehler-Jarvis

Division of
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General Offices: Toledo 1, Ohio
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★ Barber Die Casting Co. Limited
Hamilton, Ontario



and/or sub-assembling the finished parts . . .

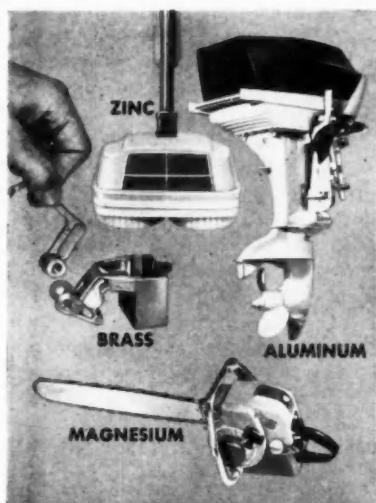
Never has as satisfactory

As the pictures above imply . . . Doehler-Jarvis makes the buying of die castings a simple matter today.

First, you deal with a Doehler-Jarvis Resident Engineer. Through him you can tap the full production and engineering talent of the most experienced company in die casting . . . no matter how large or small your requirements. Through him you obtain personal day to day liaison that insures maximum production economy through personal attention to your needs and problems.



You get immediate help in engineering the design . . . and evaluating the economics of die casting . . . plating or otherwise finishing . . .



using the most appropriate die casting alloys.



Large, fully-equipped Doehler-Jarvis plants . . .



assure economical production, reliable delivery.

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Second, in addition to the castings themselves, Doehler-Jarvis provides added resources you may need: ample alloy stocks; fully equipped die making shops; complete facilities for light metal working, including machining, finishing and sub-assembly lines; spacious die and parts storage; a huge tractor-trailer fleet to assure delivery.

Thirdly, you can be sure that Doehler-Jarvis has in its eight plants, the productive capacity to meet your schedules no matter how large . . . and a flexible

organization to give them proper attention no matter how small.

Small wonder that many companies, large and small, look upon Doehler-Jarvis almost as a department of their own plant. That's true of makers of hand power tools, of floor waxers, of sprinklers and garden hose fittings, of chain saws, of typewriters, of kitchen and other appliances, of hundreds of other products.

Doehler-Jarvis has served many companies for more than a quarter century,

some for better than 50 years. Proof enough that no other die caster provides more quality, more service and more overall economy to the customer. Ask your Doehler-Jarvis Resident Engineer to tell you how much we are prepared to do to establish equally satisfactory supplier-purchaser relations with you.

Doehler-Jarvis

Division of
NATIONAL LEAD COMPANY

for profitable short run
production...



the STRIPPIT FABRICATOR

WORK PIECE—Electronic Chassis —
10" x 14" — 23 holes — 5 sizes —
4 different shapes — 4 corner notches

SETUP TIME — 9.3 minutes

PRODUCTION RUN — 5 pieces

PRODUCTION TIME PER PIECE — 2.8 minutes

For short or pilot runs—model shop and experimental work—no other single machine can match the production capabilities and profit potential of the Strippit Fabricator.

PUNCHES—any round or shaped hole up to 3½" diameter in sheet material — up to ¼" mild steel.

NOTCHES—90° corners — rectangular, radii, vee and special shape edge notches — up to ⅛" capacity in mild steel.

NIBBLES—straight line or contour shearing up to a 38" diameter circle, at 165 strokes per minute, ⅛" mild steel.

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QUICK-CHANGE PUNCHES AND DIES—changed from one size to another in less than 20 seconds — within easy reach in labeled, built-in file drawers.

EASY CONVERSION—to a production punching unit by adding the Strippit Duplicator for high speed production of hundreds of pieces — and the Dupl-O-Scope to punch Duplicator templates from a drawing, layout or sample part.

WRITE TODAY—for Catalog 10 AA and an actual demonstration right at your own plant of the capabilities of this high-profit fabrication system, by a Strippit Mobile Demonstration Unit.

WALES STRIPPIT INC.

242 Buell Road • Akron, New York

In Canada: Strippit Tool & Machine Company, Brampton, Ontario



London Motor Show

(Continued from page 132)

ploy Girling disks, and there are separate hydraulic systems with independent master cylinders supplying the front and rear wheels.

From Daimler came a hard-top variation of its previously mentioned V-8 sports model. This has a new four-passenger body styled in the Italian idiom, and is available with automatic transmission or overdrive as optional extras.

Bristol linked up with the Italian body-builder Zagato to produce the Bristol-Zagato Grand Tourer based on the Model 406 disk-braked chassis, but considerably lighter at 2436 lb. Output of the 135-cu in. six-cylinder engine is raised to 130 hp at 5750 rpm by using a high-lift camshaft, three downdraft Solex carburetors and a tuned exhaust system.

David Brown displayed the DB4-G.T.—a Grand Touring version of the DB4 powered by the 224-cu in. engine in specially tuned form. Rated at 302 hp at 6000 rpm, the twin overhead cam unit has three dual-choke Weber carburetors, two spark plugs per cylinder and two distributors, and an aluminum alloy head with 9 to 1 compression. This model is shorter in wheelbase and overall length, and headlights are cowled to lessen wind drag.

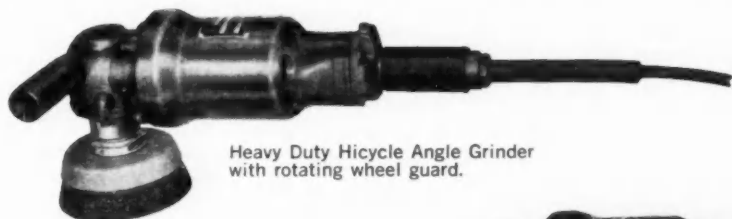
In the field of low-priced sports cars, Berkeley exhibited its miniature QB.105 with a restyled plastic body available as convertible or hardtop. Retaining front-wheel drive, it uses a 42-cu in. twin-cylinder aircooled engine developing 50 hp at 6250 rpm.

One newcomer at the show in the popular price range was a station wagon version of the Austin A.40 two-door sedan. Designated the Countryman, it has a modified rear end with the window hinged at the top to raise upwards, thereby giving greater access to the cargo area when the conventional tailgate is lowered.

The British industry is demonstrating its confidence that the present boom will continue by planning even greater expansion for (Turn to page 142, please)



ANNOUNCING NEW HEAVY DUTY 6" AND 8" HICYCLE GRINDERS



Heavy Duty Hicycle Angle Grinder
with rotating wheel guard.



Heavy Duty Hicycle Angle Sander with 9" pad.



Model CP-550-SG-4500 Heavy Duty Grinder maintains speed under load, lets the operator really lean into the work.

Here are two *all new* CP heavy duty Hicycle Grinders . . . brutes for power, demons for speed. Hicycle squirrel-cage induction motors running on 180 cycles, 220 volt, 3 phase current provide Built-in Overspeed Protection because maximum speed is always constant, always within safe wheel limits . . . speed sag under load is less than 15%.

New with these models is the CP "Tri-Flo" Cooling System that minimizes "hot spots". This highly efficient system cools motor windings, rotor shaft, main bearings, gear case and switch. Keeps the temperature rise at key points as much as 28° lower than with conventional type cooling.

You get these 7 extra advantages with CP Hicycle Grinders

1—*Hicycle Motor* of advanced squirrel-cage design means no brushes to replace, no armature to burn out. 2—*Power/Weight Ratio* is outstanding because high strength magnesium castings are used for motor, gear case and switch handle. 3—*Oil Sealed Ball Bearings* lubricated for life. 4—*Interchangeable* motors, motor housings, switch handles and switches on all straight and angle models. 5—*Heavy-duty switches* have dust tight seals and phenolic spacers for insulation from motor and to minimize vibration. 6—*Extra heavy micro-mesh gearing* heat-treated for long service. 7—*Guards* fully conforming to A. S. A. safety codes.

Write for complete information on these newest CP Hicycle Heavy Duty Grinders. Chicago Pneumatic Tool Company, 8 East 44th Street, New York 17, N. Y.


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Typical Applications
Rivett reducing valves

Model numbers of normally open valves for reducing pressure may be selected from page 14; corresponding dimensions are shown on pages 15 and 16.

Sequence Valves
A normally open model valve is used to shut off or regulate flow in a sequence valve. In application, the connection may be taken from some other point in the system. An external drain is required to provide a pressure independent of the effect of load variation. Appropriate selection of model numbers can be made from page 14; dimensions are shown on pages 15 and 16.

FIG. 9
Pilot Pressure—External Drain—Return

FIG. 11
Pilot Pressure—External Drain—Return

FIG. 10
Pilot Pressure—External Drain—Return

FIG. 12
Pilot Pressure—External Drain—Return

FIG. 14
Pilot Pressure—External Drain—Return

the "BIBLE" of FLUID POWER!

New authoritative instruction manual describes pressure controlled hydraulic valves—information never before published!

You will find this complete and factual material extremely valuable for planning a modern hydraulic circuit! Written by engineers long experienced in fluid power design, this new 8½ x 11 book shows operations and applications of all pressure controlled valves — relief, sequence, reducing, unloading and counterbalance.

A helpful guide to selecting the proper valve for the job, Rivett's new Catalog No. 230 discusses in detail all factors influencing correct choice: normal spool position, operating pressure source, pilot or direct operation. Also shown are flow diagrams, pressure vs. flow curves, ratings, dimensions, drawings and specifications.

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...the best answer to many automotive design problems

HYPALON synthetic rubber provides qualities not available in conventional elastomers for automotive design problems. HYPALON can be compounded to give a completely ozone-proof and color-stable elastomer with excellent weather, abrasion, oil and heat resistance.

This unique combination of properties has made HYPALON the choice of many design engineers for a variety of automotive applications—ignition cables, spark plug boots, coatings for door and deck lid seals, coatings for headliners, replacement convertible tops, and for white tire sidewalls.

Investigate the design advantages of HYPALON. It is currently being used for coating fabrics, for molded and extruded goods and for solution coatings in a range of nonstaining colors. For more information, call your rubber supplier or write E. I. du Pont de Nemours & Co. (Inc.), Elastomer Chemicals Department AI-11 $\frac{1}{2}$, Wilmington 98, Delaware.



SYNTHETIC

RUBBER

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HYPALON[®]
VITON[®]
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Better Things for Better Living . . . through Chemistry

London Motor Show

(Continued from page 138)

the future. B.M.C. intends to double its production of all vehicles within the next two years. Ford has announced that it will invest a further \$125 million to reap the full benefits of the \$195 million it has recently spent on new plant. Rootes has earmarked another \$28 million to improve its facilities.

Standard-Triumph is completing

a new \$4.2 million assembly facility, and expects its output to reach 185,000 by the end of 1960, thereby replacing the loss of its Ferguson tractor interests which have been sold to Massey-Ferguson. By next year Britain's car production alone is seen as rising to 1.6 million units.

But a blot on this picture of unprecedented prosperity is the uncertain outlook for exports, on which U.K. manufacturers are so dependent. Although foreign sales

have mounted steadily in recent years, West Germany has now overtaken Britain as the world's leading vehicle exporter as well as the biggest producer in Europe.

British shipments of cars to traditional Commonwealth markets such as Australia, South Africa and New Zealand have dropped considerably in the past year. Sales to western Europe have lagged or shown only slight gains, despite the fact that this area represents a market of great potential.

These countries — and particularly Germany — have substantial reserves of buying power, but British penetration has not kept pace with the underlying demand. This is due to neglect and lack of enterprise, as well as to self-exclusion from the European Common Market which will increasingly handicap U.K. cars on both prices and quotas.

Meanwhile, the United States has become the mainstay of the British industry, taking some 40 per cent of its car exports. Putting so many eggs in the dollar basket is viewed with misgiving in some quarters.

There is an uneasy feeling about relying so heavily on the long-term stability of the American economy and on continuity in taste of the motoring public there, coupled with apprehensions about the impact of U. S.-built compact cars. If, in fact, Americans take to buying locally-produced models, combining economy and driving ease with comfort, at the expense of foreign imports, Britain will suffer seriously.

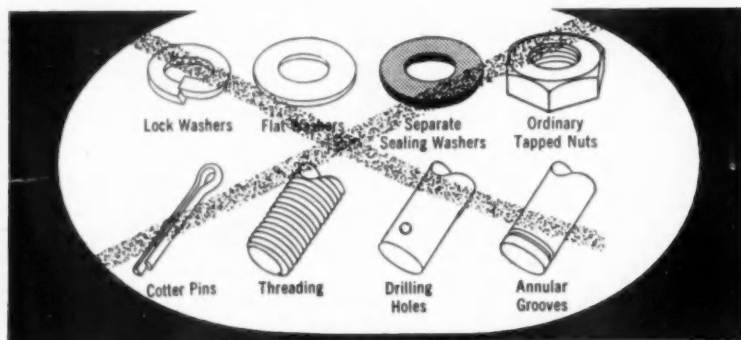
Against this, it is argued, U. S. cars in the new class will be competing with a relatively small sector of British production and exports, which are concentrated in the lower-capacity and sports ranges. There is also the belief that widespread acceptance of these smaller domestic models will partly rub off on European machines, establishing a trend that will create even further demand for them.

The next few months should indicate whether the present optimism in the British industry is justified. ■

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Eliminate

one or more of these assembly parts or operations



— and provide compact, vibration-proof assemblies

PALNUT Lock Nuts for threaded members



• A single PALNUT Lock Nut replaces ordinary nuts, lock-washers, flat washers and sealer washers, according to application and type used. Cost less than ordinary nuts, save weight and space, assemble fast.

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• Save threading costs. Form their own deep, clean threads while tightening on studs, rod or wire of any malleable materials. Fast assembly with standard tools. Vibration-proof grip.

PUSHNUTS® for unthreaded studs and rod



• Simply push on unthreaded studs, rod, wire or rivets. Strong spring grip resists removal. Save threading, grooving, drilling, cotter pins. Low in cost, fast assembly.

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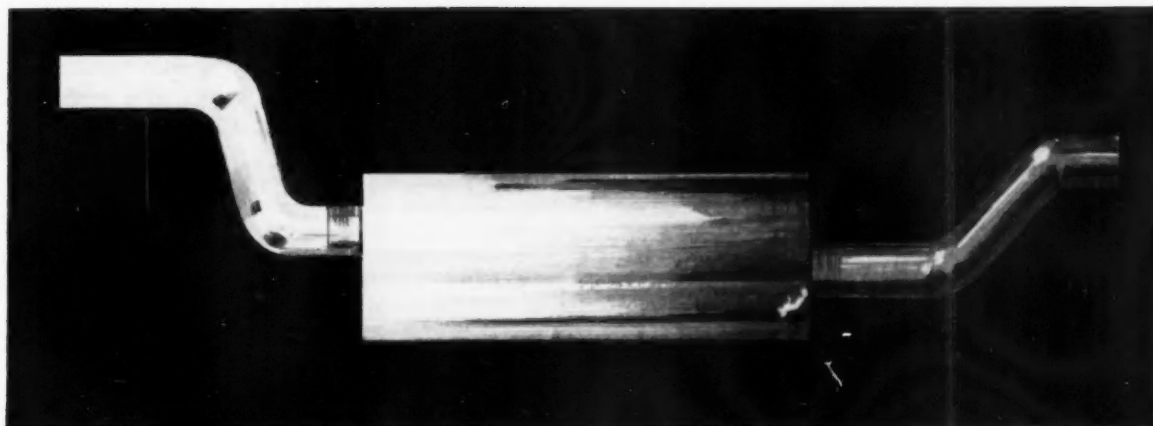
Write for literature and free samples, stating type, size and application.

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LOCK NUTS FASTENERS



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Protect Exhaust Systems From End to End with Armco ALUMINIZED STEEL

New steels are
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No two areas of an auto exhaust system suffer exactly the same kind of destructive attack. In some locations, varying combinations of heat and corrosive condensate chew at exhaust system parts. Table 1 gives an idea of the destructive constituents of typical exhaust condensates. Laboratory tests indicate an average PH for similar condensates of about 2.7. In other areas, heat alone is the enemy.

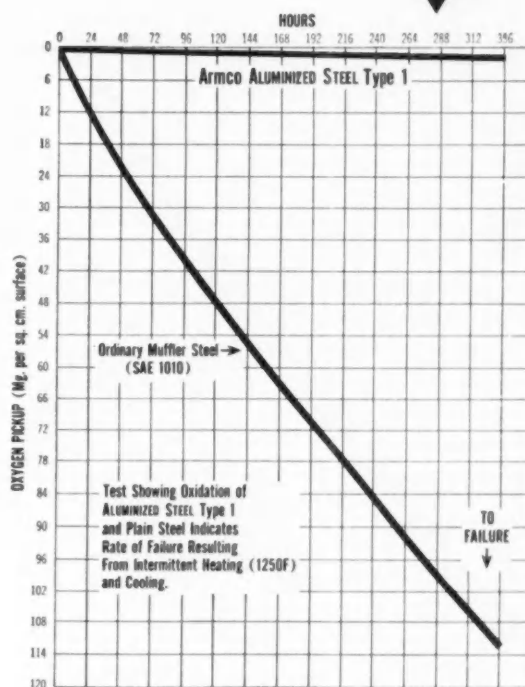
Wherever the attack, however, Armco ALUMINIZED STEEL Type 1 provides longer service life. Against deadly combinations of heat and corrosion ALUMINIZED STEEL stands up longer than any metal in its price class. Where high temperature is the major culprit, ALUMINIZED STEEL provides many times the resistance of carbon steel, as evidenced by Graph A.

In short, Armco ALUMINIZED STEEL Type 1 in exhaust system parts saves car owners money and trouble—gives auto manufacturers an important sales feature. For more information on this durable hot-dip aluminum coated steel, write Armco Steel Corporation, 3149 Curtis Street, Middletown, Ohio.

TABLE 1

AN ANALYSIS OF EXHAUST CONDENSATES

Constituent	Concentration—ppm
Sulfates (SO ₄)	690
Chlorides (Cl)	520
Bromides (Br)	370
Lead (Pb)	9

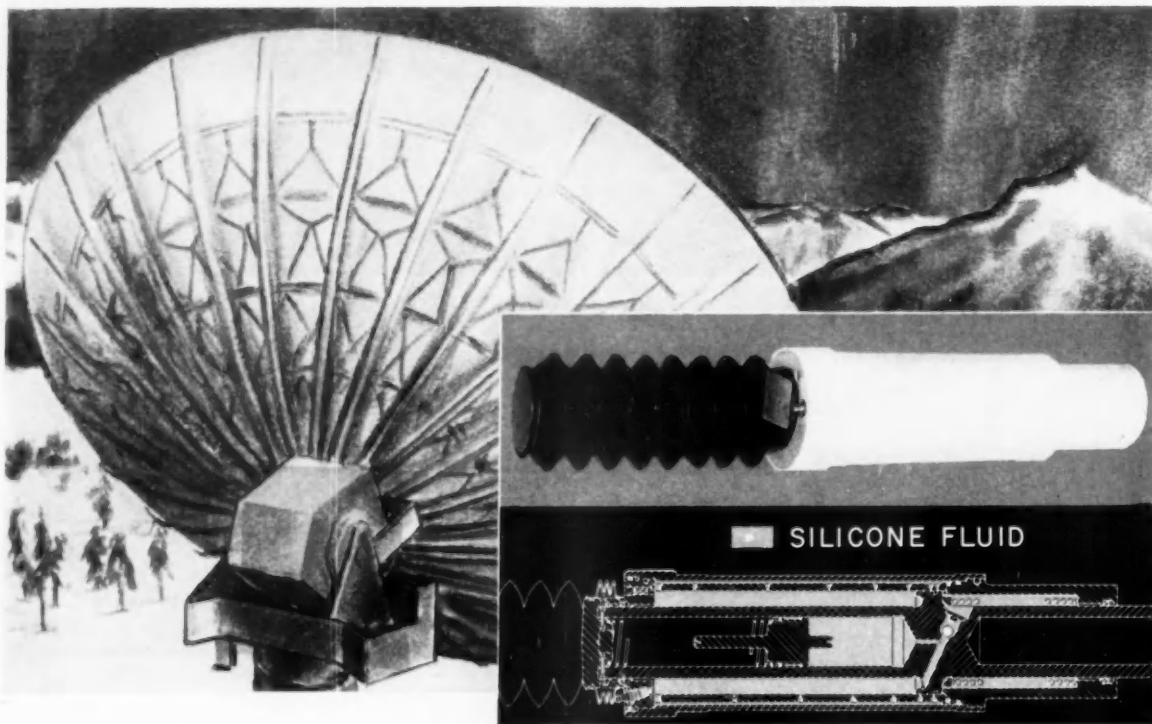


ARMCO STEEL



Armco Division • Sheffield Division • The National Supply Company • Armco Drainage & Metal Products, Inc. • The Armco International Corporation • Union Wire Rope Corporation

Silicones Soak Up Shock



Dow Corning Damping Fluids Unaffected by Cold, Heat, Time

"Steady-state" fluids — that's what some engineers call these exceptionally stable damping media. And steady they are. Their useful range extends from as low as -100 F on the cold side to over 400 F on the hot side! Within these extremes, viscosity varies but little. They're resistant to oxidation and to breakdown under shear; won't sludge; won't corrode metals. Because of such properties, silicone fluids are highly effective media for damping, springing and torque converting.

Illustrated above is one example. It's a Radar Antenna Buffer, designed and built by Houdaille Industries, Buffalo, N. Y. Radar equipped with this unit, "Has silicone; won't over-travel." For that's where the buffering comes in. When the antenna swings to its travel limit, something must give, or the structure may be shock-damaged. What "gives" is the Buffer, and the working medium is Dow Corning silicone fluid. Because the damping fluid's viscosity is unaltered by temperature changes, performance of the Buffer varies less than 1% per 100 Fahrenheit degrees. That's important, because installations of ballistic missile early warning radar, which use the Buffer, may vary from tropic to Arctic.

This is but one of many designs where silicone fluids have aided the product engineer. Others include auto fan drives, aircraft oleo struts, missile accelerometers, and truck scales. If in your design you require a high performance damping or coupling fluid, investigate Dow Corning Silicones . . . the fluids with "steady-state" viscosity. Write to Dept. 0623 for more detailed information.

TYPICAL PROPERTIES OF DOW CORNING 200 FLUID*

Centistokes at 25 C	Pour Point, °F	Visc./temp. ¹ Coefficient	Coeff. of Expansion cc./°C
10	-85	0.57	0.00108
50	-67	0.59	0.00104
100	-67	0.60	0.00096
500	-58	0.62	0.00096
1,000	-58	0.62	0.00096
12,500	-51	0.58	0.00096

*Available in a range of viscosities to over a million centistokes.

¹ $\frac{\text{Viscosity at 210 F}}{\text{Viscosity at 100 F}}$

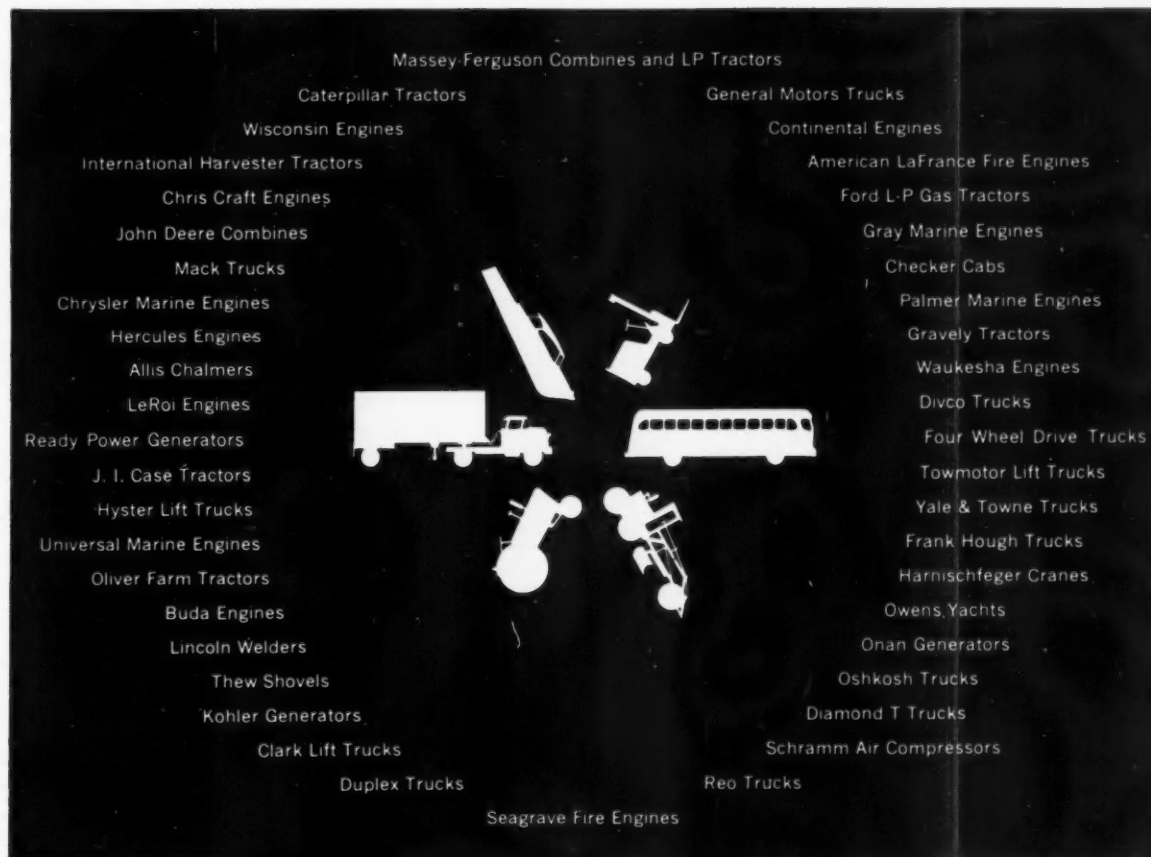
Your nearest Dow Corning office is the number one source for information and technical service on silicones.



Dow Corning CORPORATION
MIDLAND, MICHIGAN

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ZENITH EXPERIENCE WITH CARBURETORS PAYS OFF IN ANY FIELD



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Because Zenith can call upon so much experience with more types of engines, the above firms know they are in good hands when they specify Zenith Carburetors. As you, too, will discover: *Zenith experience provides important extra benefits.* For detailed information, write Zenith Carburetor Division, 696 Hart Avenue, Detroit 14, Michigan.

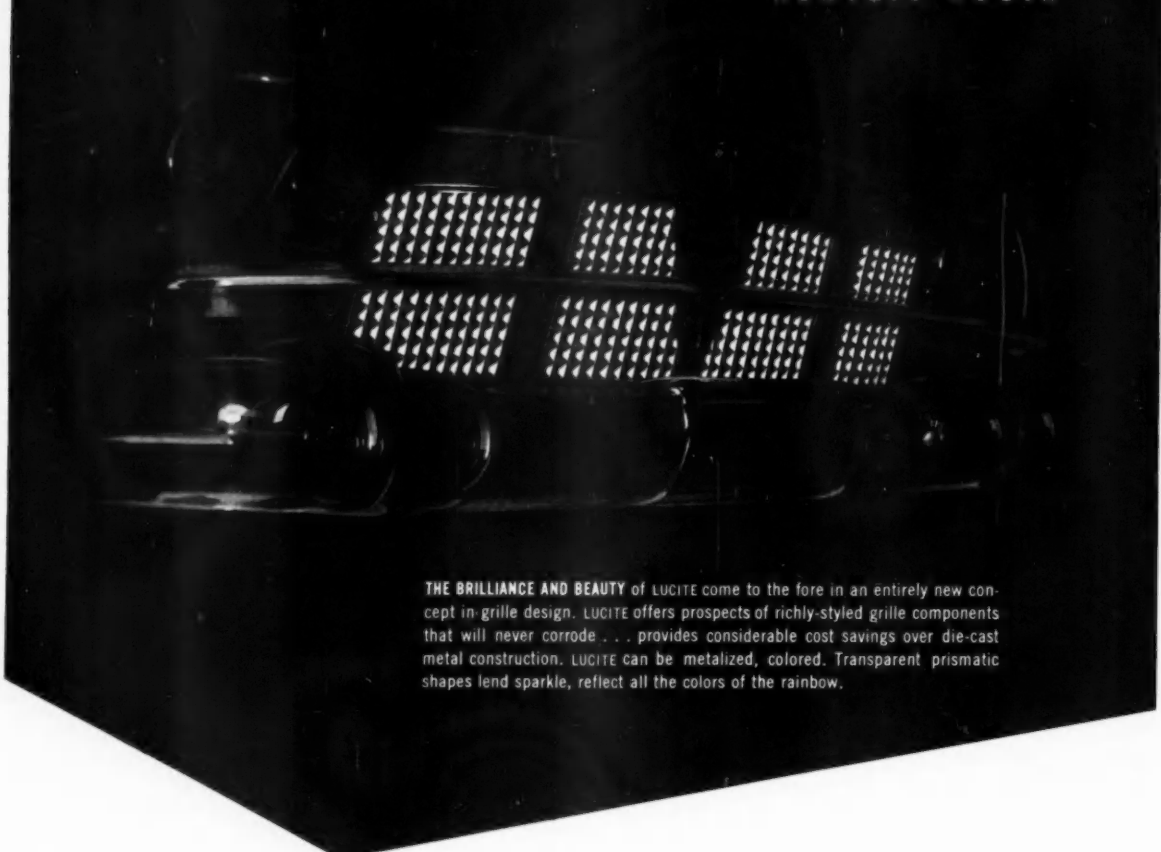
Zenith Carburetor Division

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ACRYLIC RESIN



THE BRILLIANCE AND BEAUTY of LUCITE come to the fore in an entirely new concept in grille design. LUCITE offers prospects of richly-styled grille components that will never corrode . . . provides considerable cost savings over die-cast metal construction. LUCITE can be metalized, colored. Transparent prismatic shapes lend sparkle, reflect all the colors of the rainbow.

Have you thought of LUCITE as a replacement for materials that are *not* transparent? LUCITE gives you the advantage of greatly increased attractiveness. Often the advantage is one of cost.

LUCITE is easily and economically molded into large panels, shapes and sheets. Sturdy, intricate pieces can be formed. An example is the projected use of LUCITE for automotive grille components (shown above). LUCITE

resists weather, chemicals and moisture and cannot corrode. It comes in many forms . . . transparent, translucent, colored.

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POLYCHEMICALS DEPARTMENT

LUCITE®
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BETTER THINGS FOR BETTER LIVING...THROUGH CHEMISTRY

ASA Conference

(Continued from page 75)

A very active and important and, according to some people, an almost hopeless standardization project is directed toward a revision of our present drill standards. This project is handled simultaneously by several chapters, which maintain close contact with each other in this matter. It is generally agreed that our present system of listing drills by fractions, whole numbers, letters, millimeters, and decimals is due for revision.

The setting up of standards in a new and rapidly revolving field of tool technology (e.g. tape control and optical tooling) requires a great amount of foresight, imagination, patience, and restraint. It is a waste of effort to standardize on something that may be obsolete in a short time. It is better to recognize this and limit any standardization to cover, for example, only definitions in terminology.

Philosophy of Fastener Standardization

By R. B. Belford

Technical Adviser

INDUSTRIAL FASTENERS INSTITUTE

WHEN selecting a fastener for use in a certain application, the user is interested in knowing just one thing—will it do the job for which it's intended? The best assurance that it will is a specification based strictly on the end properties of the finished product.

The dimensional, physical, and mechanical characteristics can be readily checked against known requirements. Test can be established to simulate closely the service application; and the behavior of the part can be easily and economically evaluated.

When standards are written around end properties, additional secondary requirements, such as those dictating selection of material or choice of manufacturing method, can be kept to a minimum or eliminated entirely. Actually, inclusion of restrictive controls tends to limit the manufacturer's scope, and while contributing little, if anything, to the service usefulness of the product, may have unexpected and undesirable consequences. Secondary operations may be added, special identification and handling may be required, delivery may be seriously delayed, and the number of qualified suppliers will be reduced. Quite obviously, each adds to the cost of production.

When only end properties are specified, the manufacturer is permitted maximum flexibility, his ingenuity and desire to develop cost setting techniques are encouraged, and he can take quick advantage of new improvements and technical advances. Pressures of normal com-

petition will assure the consumer maximum economy without sacrifice of quality or service dependability.

This then, simply stated, is the fundamental philosophy of fastener standardization. Fastener standards and specifications should be based on the end properties of the finished product; decisions as to specific choice of material analysis, production method, and subsequent treatments should be the responsibility of the manufacturer.

The Purchasing Executive's View of Standards

By William D. Schelbe

Director of Purchases

Wolverine Tube Division
CALUMET & HECLA, INC.

THE ever-increasing competition encountered by American industry from competitors in this country and from foreign sources and the continued inflationary trends with which we must contend make the promotion and use of standards more and more important. Standards are certainly the finest tool available to industry today in fighting these competitive battles.

There seem to be two broad concepts of standardization. One, that has been most used and has produced fine results, is of the type implemented by ASA. The other concept of standardization, particularly from a purchasing viewpoint, incorporates value analysis.

Value analysis is defined as a study of function—the function of any part, material, or service being simply the job it performs. It seems to me



SPEEDOMETER of the 1959 Ford employs the crystalline transparency of LUCITE for better viewing of dials... its shatter resistance for safety. Often, the light-piping ability of LUCITE permits convenient placement of light sources.



TAILLIGHTS of LUCITE in the Ford give maximum visibility because of their highly efficient light transmission. They resist cracking and crazing, retain their beauty throughout the car's service life. Lenses are unaffected by sunlight, moisture.



MEDALLION back-painted in red, white and blue identifies the Chrysler 300 E with a flash of brilliant color. The medallion resists impact and remains bright as new in all climates.

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ACRYLIC RESIN
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Better Things for Better Living... through Chemistry

that our purchasing concept should be that we must value analyze, then standardize. There are many large and important corporations in the country today that can show tremendous savings through the use of a value analysis-standardization program. Standardizing on a single brand name may simplify upkeep and reduce inventory, but such a step cuts off the purchasing agent from opportunities for value analysis. He

might then miss the opportunity to discover a much less expensive piece of equipment that could do the job just as well. He might also be cut off from developments by other manufacturers.

Standardization, particularly on brand names, for the sake of standardization alone, is not enough. Expressing the purchasing viewpoint, I say, "Value analyze first, then standardize."

Six Easy Ways to Save Money In Fasteners

By Frederick E. Graves

Assistant Technical Director

RUSSELL, BURDSALL & WARD BOLT AND NUT CO.

THE application of standardization to fasteners will result in reduced inventory and purchase cost. Six areas in which this application will prove profitable are:

1. Standardize on coarse threads to a Class 2A external fit or a Class 2B internal fit. Designate as special all other threads and class of thread fit other than 2A or 2B. Try to make sure that there is a sound engineering reason for special thread pitches.

2. Standardize on the use of bolts or cap screws in place of stud and nut combinations wherever possible. This, of course, refers to studs that are less than one in. in diameter and less than six in. long.

3. Standardize on a maximum of three or four head styles for machine screws and standardize on hex head bolts rather than square heads.

4. Except where corrosion-resistant properties are important, specify bolt materials according to the physical

properties necessary for the functional requirement rather than specifying chemical analysis.

5. Investigate the possibility of standardizing on commercial zinc plating for any application where there is no unusual corrosion problem.

6. Rather than using various combinations of machine bolts, bright cap screws, and high strength cap screws, consider the possibility of standardizing on the high strength cap screw or bolt. This grade of fastener is made from 1038 steel, heat treated to a tensile strength of 120,000 psi, and provides the greatest number of pounds of holding power per dollar of fastener cost.

What's Ahead in Nut Standards

By Robert L. Riley

Assistant General Manager

BETHLEHEM STEEL CO.

THERE is presently considerable activity in nut standards and nut development. In brief, the most important things to come may be summarized as follows:

1. Establishment of an optimum nut testing method.
2. Development of nut data, based on research, explaining distribution of load and behavior of nuts under various conditions of stress.
3. Elimination of regular nut series.
4. Consideration of renaming heavy and finished hex nut series.
5. Further simplification of nut styles.

PATENT CHANGES

Changes in patent procedures are being urged by some top defense contractors. Conflict between patent rights and defense procurement practices is hurting the U. S. in the race with Russia for technological superiority, they say. Problem is that while patents give inventors a legal monopoly to encourage improvements, Defense Department buying agents often shun patented inventions because they insist on alternate supply sources.



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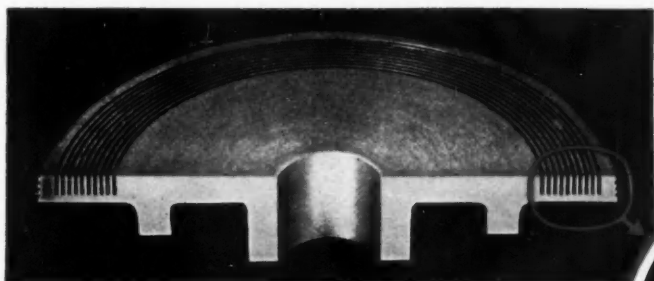
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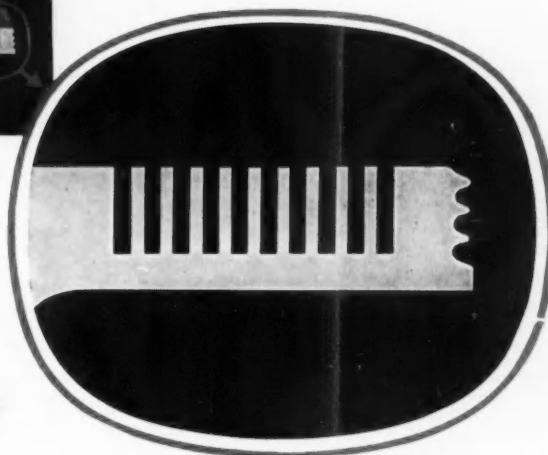
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The fine dispersion of graphite in Eaton Permanent Mold Iron and its dense, non-porous, homogeneous structure make it an ideal material for many difficult machining operations where accurate dimensional results and sharp corners are essential.

Because its superior structure permits the machining of extremely thin sections and has the ability to take a high surface finish, Eaton Permanent Mold Iron is recommended for such critical applications as bearing retainers, connecting rods, pulleys, carburetor bodies, valve bodies, and service valves.

If you have applications which require these exceptional characteristics, our engineers will be happy to work with you.

The part shown above required that 10 grooves, .023" wide and .125" deep, leaving 9 lands .015" wide, be rapidly and simultaneously machined. Eaton Permanent Mold Iron proved to be the ideal material—completely eliminating the problem of curling chips in the small grooves, and crumbling of lands during machining.

Check these Important Advantages:

- ★ Dense, non-porous, homogeneous structure
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- ★ Excellent tensile strength
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- ★ Freedom from leakage under pressure
- ★ Intricately cored sections
- ★ Uniformity of castings
- ★ Higher machining feeds and speeds
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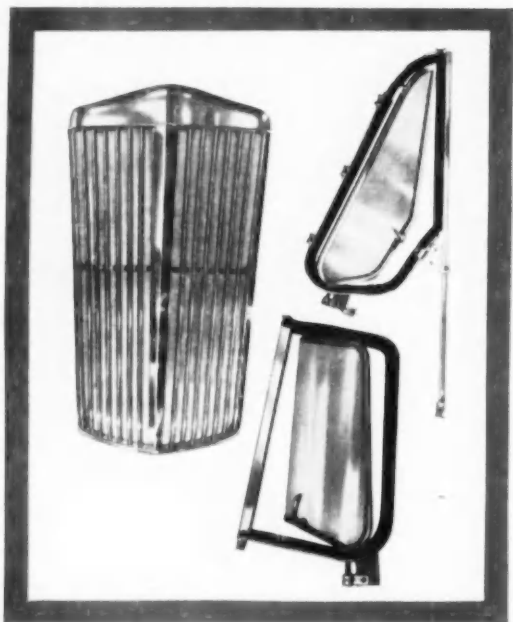
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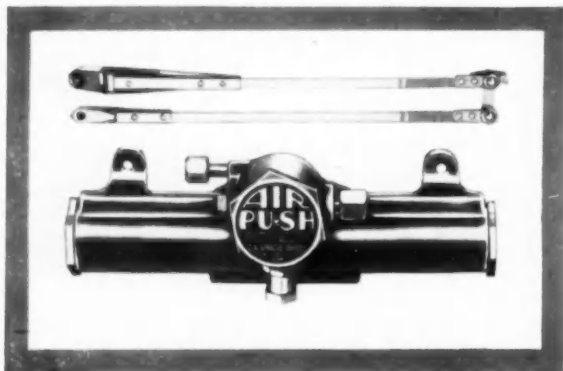
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Problem-Solving Products from Republic

FUNCTIONAL STAINLESS STEEL IS CORROSION-RESISTANT, STRONG, WEIGHT-SAVING, READILY FORMED



The high strength-to-weight ratio of stainless steel permits the use of slimmer channels and frames in passenger car and truck sash. Protected by stainless, glass breakage is less likely. Strength, dent-resistance, and corrosion-resistance make stainless ideal for radiator grills. Manufacturer—Excel Corporation, Elkhart, Indiana.



Stainless steel makes an important contribution to the safe operation and maintenance of windshield wipers. Stainless steel's strength assures resistance to breakage or distortion. Light, strong design reduces dead weight that the wiper motor must move. Elasticity of stainless gives the blade the proper pressure on the glass. The wiper arms are protected against the slow and insidious weakening effects of corrosion. Manufacturer—Sprague Devices, Inc., Michigan City, Indiana.

Always right, always bright stainless steel, the optimum metal for trim and brightwork, is showing up in ever-increasing functional applications.

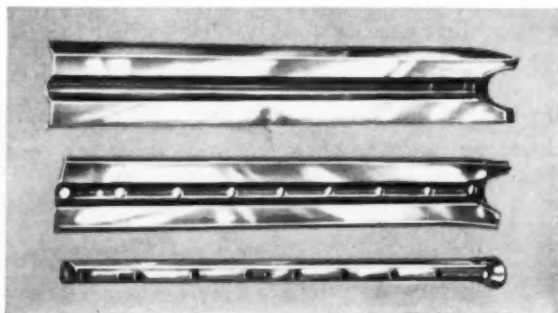
The reason? Stainless steel offers automotive part and equipment manufacturers and designers a combination of qualities unobtainable in any other commercial metal.

Stainless steel parts are tough and strong, yet lightweight. They offer outstanding resistance to heat, wear, and abrasion. They stubbornly resist rust and corrosion. Maintain their great strength through extremes of heat and cold.

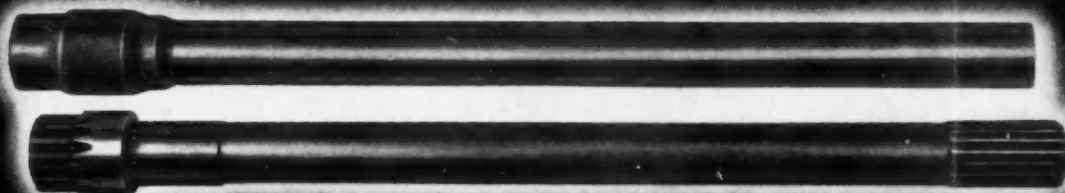
Stainless is readily formed into desired shapes and designs on present equipment with little or no change in procedure and often at lower ultimate cost. Conventional welding techniques, currently in use on production operations, permit the combining of strong, lightweight stainless to carbon steel panels. The result is an over-all reduction in weight without loss of strength or safety, and a structural member that is both functional and decorative.

The functional stainless steel parts and equipment illustrated on these pages represent only a few of many current applications. Others include: mufflers, head gaskets, exhaust manifold butterfly valves, fasteners, heat exchangers. Future applications are practically unlimited.

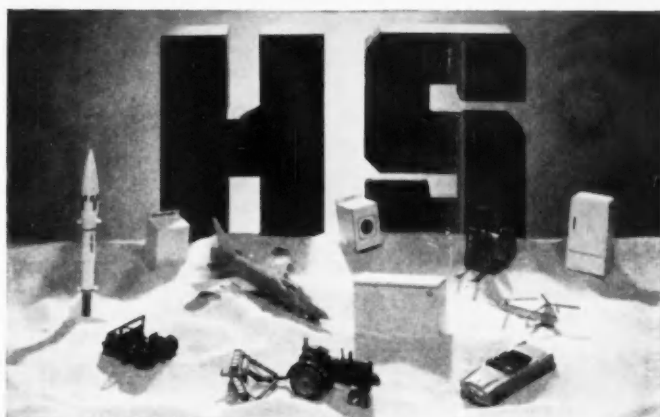
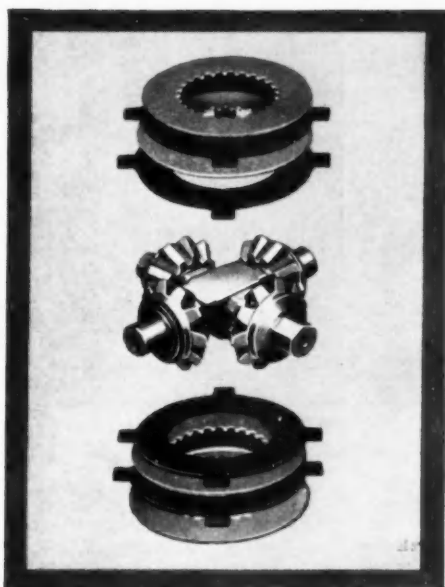
Republic Stainless Steel metallurgists and engineers are always available for consultation on development, selection, application and processing. No obligation for their services. Just mail the coupon.



Formability, corrosion-resistance, and cost were prime factors in switching to stainless steel from brass in this engine water distribution tube. Stainless was easily fabricated on existing tools. It took the constant flow of hot water and anti-freeze chemicals in stride. The greater strength of stainless virtually eliminated loss from bent or damaged tubes. Photo sequence shows fabricating operations: (1) Blank of .010" stainless strip after initial drawing and embossing, (2) Same blank after piercing of water outlet holes trimming of flanges, (3) Completed tube after roll-forming and lock seaming. Produced by Pontiac Motor Division of General Motors Corporation.



NEW FABRICATING PROCESS MEANS ECONOMY. Ford Tractor power take-off countershafts cost less to produce using Republic Die-Form blanks, as compared with previous materials. Blank is shown at top, completed shaft below. Die-Form is a new method of cold forming hot rolled carbon, alloy, or stainless steel bars into multi-diameter blanks ready for final machining. Because Die-Form blanks closely approximate the completed part, scrap losses are negligible. Improved machinability permits savings through use of higher speeds and feeds. Mail coupon for complete facts.



NEW HIGH STRENGTH POWDER, TYPE HS 6460, opens the way for new applications using sinterings for highly stressed parts. Type HS 6460 can be used with existing operating equipment. It provides a minimum tensile strength of 60,000 psi at 6.4 density as sintered, 100,000 psi heat treated. Type HS 6460 maintains its dimensional characteristics after sintering—less than .004 inches per inch shrinkage from die size at 6.4 density. Available in production quantities up to and including 12 tons, or in multiples thereof. Mail coupon for technical data sheet.

SUPER TOUGHNESS AND STRENGTH at critical points are provided by Republic Alloy Steels in the Powr-Lok Differential developed by the Dana Corporation, Toledo, Ohio. Dana engineers have reduced the possibility of mechanical breakdown in clutch rings and side gears to an absolute minimum by forging these parts from Republic Hot Rolled 8615 Alloy Bars. This fine steel offers superior strength and toughness to withstand torque, fatigue, shock, and stress. Uniform response to heat treatment gives the parts hard surfaces around tough cores providing maximum resistance to abrasion, friction, and wear. An exceptionally high strength-to-weight ratio permits the designing of thinner sections to save weight and hold down size. Send coupon for full facts.

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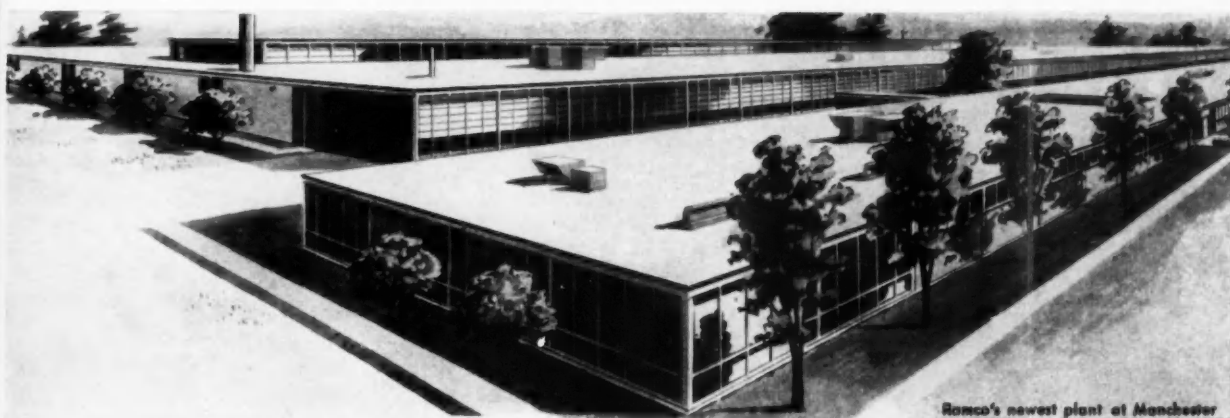
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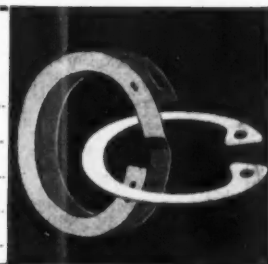
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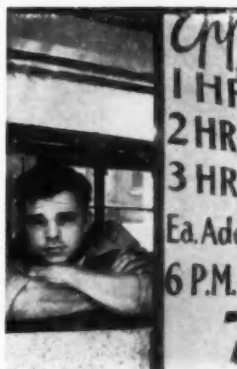
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"Stainless Steel is the best thing that ever happened to auto trim . . . and the parking lot industry,"

says Jackie Roller, Parking Attendant, Eppy's, Pittsburgh, Pa.

Q. Mr. Roller, do you feel qualified to comment on Stainless Steel auto trim?

A. Well, I've been knocking around in this business for eight years now and I pretty well know all the wrinkles.

Q. And what do you think about Stainless Steel?

A. Stainless Steel is the best thing that ever happened to auto trim.

Q. How would you compare it to other trim materials?

A. It's stronger.

Q. You mean Stainless Steel trim isn't a decoration that's going along for the ride . . . it adds to the structural strength of the car because Stainless is so strong?

A. . . . yes.

Q. And what about the much greater hardness of Stainless Steel?

A. Much harder.

Q. Doesn't the extreme hardness of Stainless Steel trim make it more resistant to dents and scratches that would mar other trim materials?

A. Yes. It's the best thing that ever happened to us parking attendants. You should hear how . . .

Q. What about the overall appearance of Stainless Steel trim?

A. Very nice.

Q. We mean, doesn't the hardness and corrosion resistance of Stainless Steel keep it bright and clean for years?

A. Yes.

Q. Doesn't Stainless Steel have a deep, jewelry-like luster that far outclasses any other trim material?

A. Yes . . . far.

Q. Don't you feel that the luster of Stainless Steel bespeaks taste instead of gaudiness?

A. Yes.

Q. Now, do you feel that even though Stainless is a little more expensive than other trim materials, it will often actually save money for car manufacturers?

A. Yes . . . Well, no, I never felt that.

Q. Well, don't you feel that because of its greater strength and hardness, manufacturers don't have to over-design with Stainless Steel? Won't a little bit of Stainless Steel look better, work harder, and cost less than a lot of weaker metals? And because Stainless is easy to fabricate, won't it save money in production—for example, replace more expensive die castings with Stainless Steel stampings?

A. Yes.

Q. Would you say that these advantages—strength, hardness, appearance, formability, and economy—are reasons why manufacturers use more and more Stainless Steel trim every year . . . and why dealers and buyers are glad they use more?

A. Yes.

Q. Thank you, Mr. Roller.

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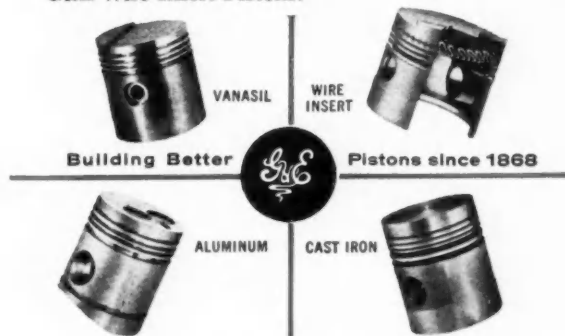
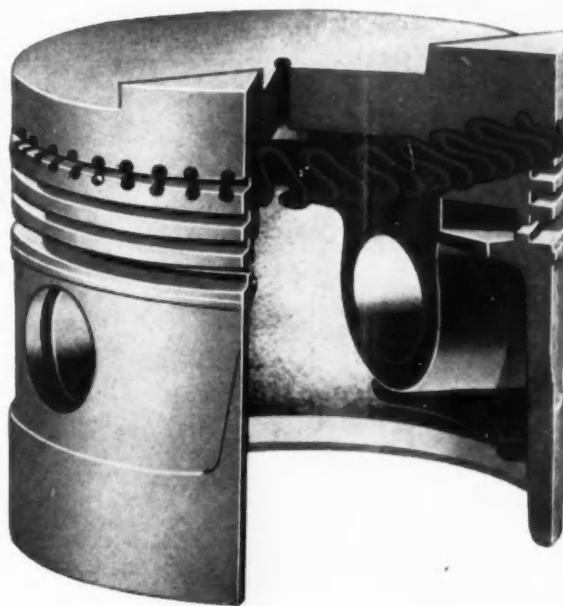


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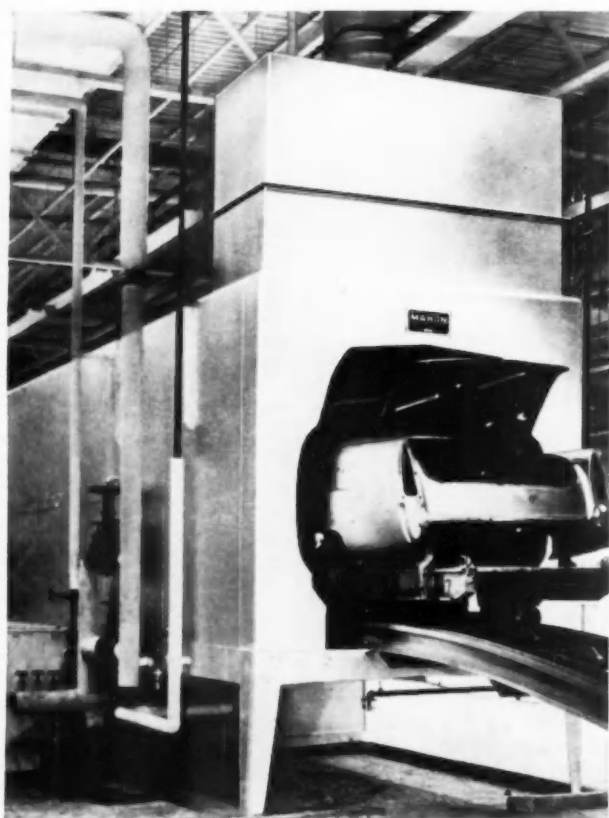
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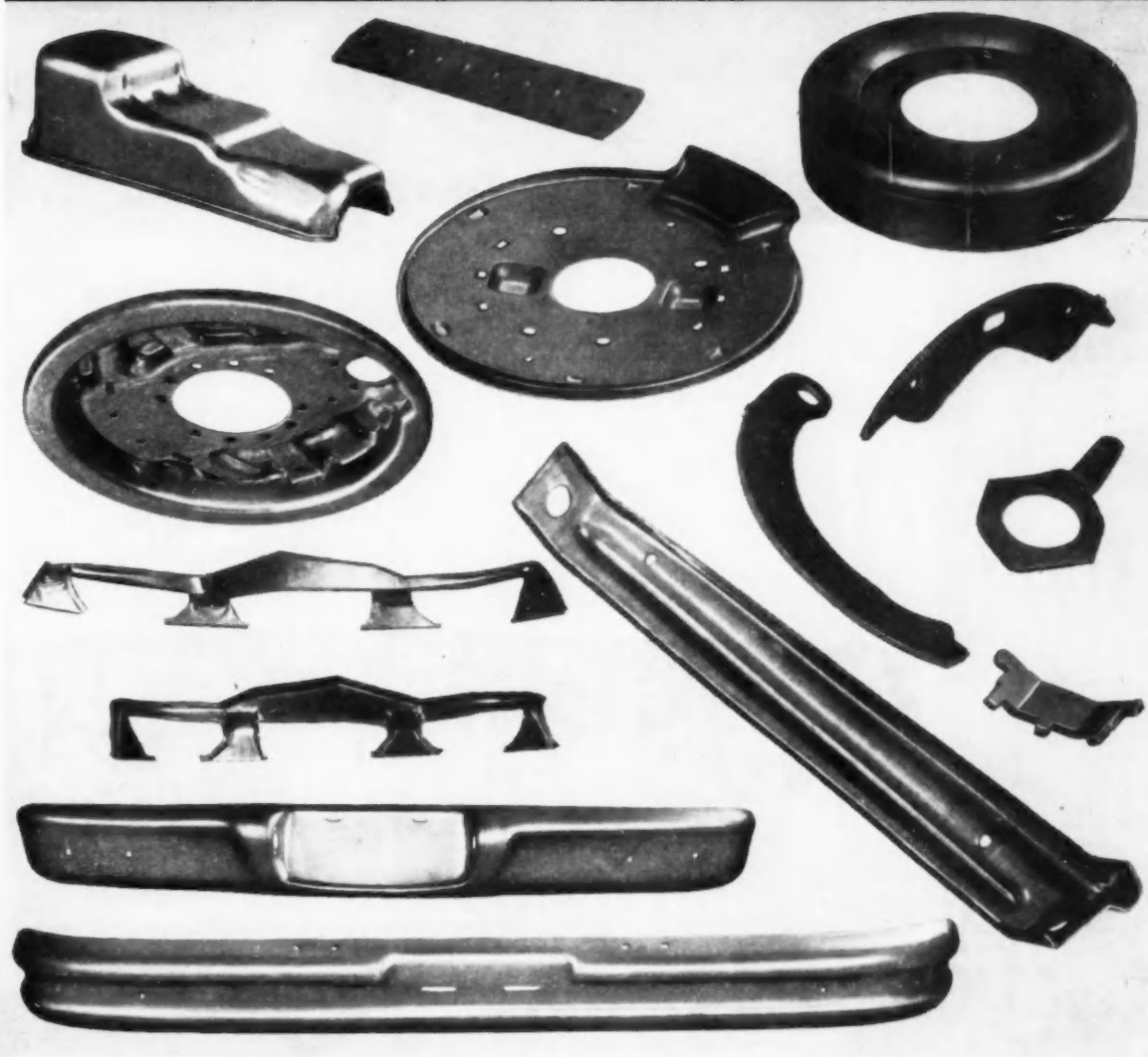
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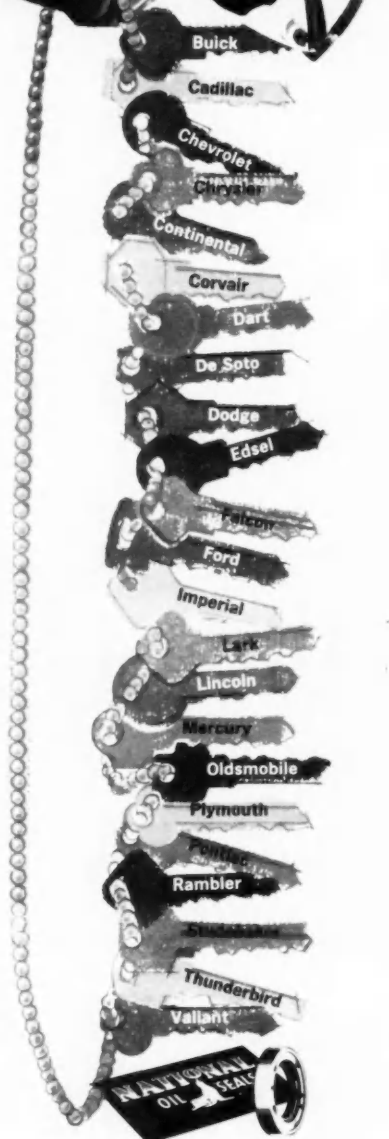
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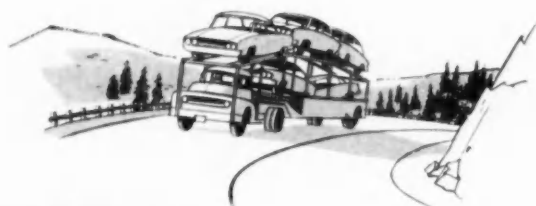
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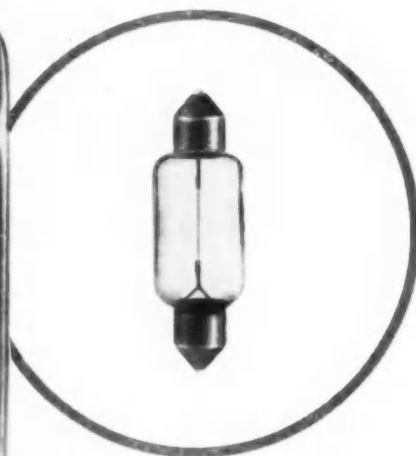
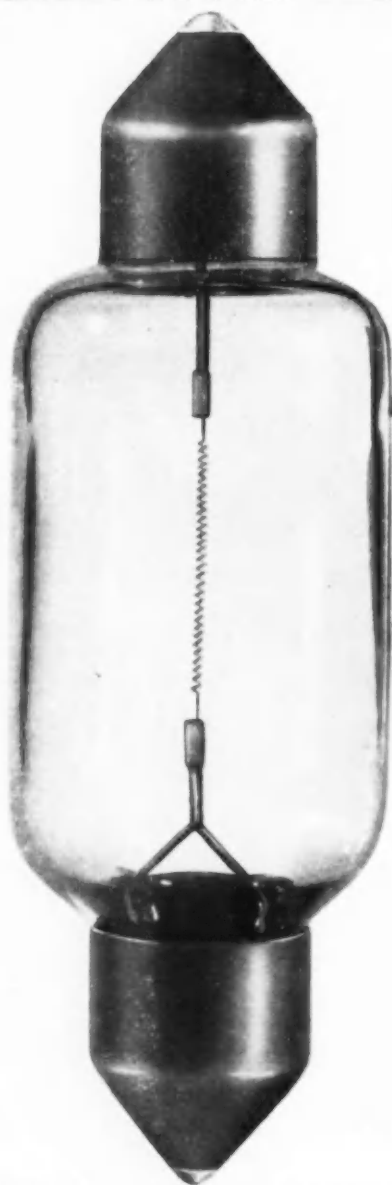
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Of European origin, the cartridge lamps are being domestically manufactured solely by Tung-Sol. And it takes Tung-Sol, the foremost automotive lamp manufacturer with its consistently high production standards, to make these economical miniature lamps and meet the high-efficiency lighting demands of today's vehicles. For more information write to Tung-Sol Electric Inc., Newark 4, N. J. TWX: NKI93

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SALES OFFICES: Atlanta, Ga.; Columbus, Ohio; Culver City, Calif.; Dallas, Texas; Denver, Colo.; Detroit, Mich.; Irvington, N. J.; Melrose Park, Ill.; Newark, N. J.; Philadelphia, Pa.; Seattle, Wash. Canada: Montreal, P.Q.

HEADQUARTERS

for tough valve gear problems

When you're facing difficult problems involving valve gear, the men to see are Chicago's tappet engineers. For, in 25 years of specialization on valve train parts, we have encountered and solved many problems similar to yours.

Applications, such as those illustrated, are typical examples . . . and the operational records established by Chicago tappets of all types in more than 25,000,000 engines are the best testimonial to their success in meeting the toughest industry requirements.

Even when your engine does not present unique requirements in valve gear design, checking with Chicago can often assure a performance bonus. Chicago's hydraulic tappets, for example, assure longer trouble-free life, reduced starting noise, and quieter operation.

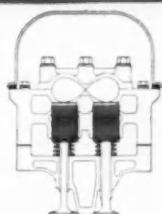
For Any Engine

Car, truck, tractor, diesel . . . aircraft, outboard, power mower, or industrial . . . whatever your type of engine, big or small . . . it will pay you to consult Chicago's development engineers *while you are still in the preliminary design stages.*

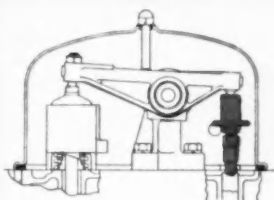


Write or wire our Tappet Division today

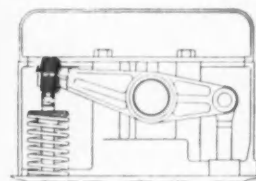
Hydraulic and Mechanical Tappets (Barrel or Mushroom Type) of Alloy Steel, Hardened Alloy Cast Iron, Chilled Iron, or Alloy Chilled Iron • Push Rods • Adjusting Screws



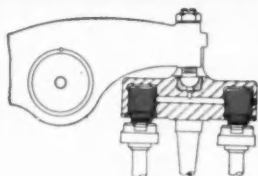
Hydraulic Inverted Cup Type Unit



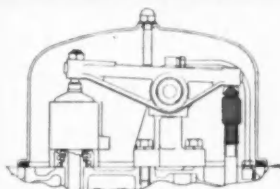
Push Rod Type with
Compression Release Application



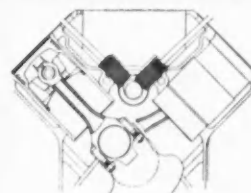
Threaded Type Rocker Arm Unit



Dual Valve T-Bridge
Hydraulic Application



Hydraulic Unit
on End of Push Rod

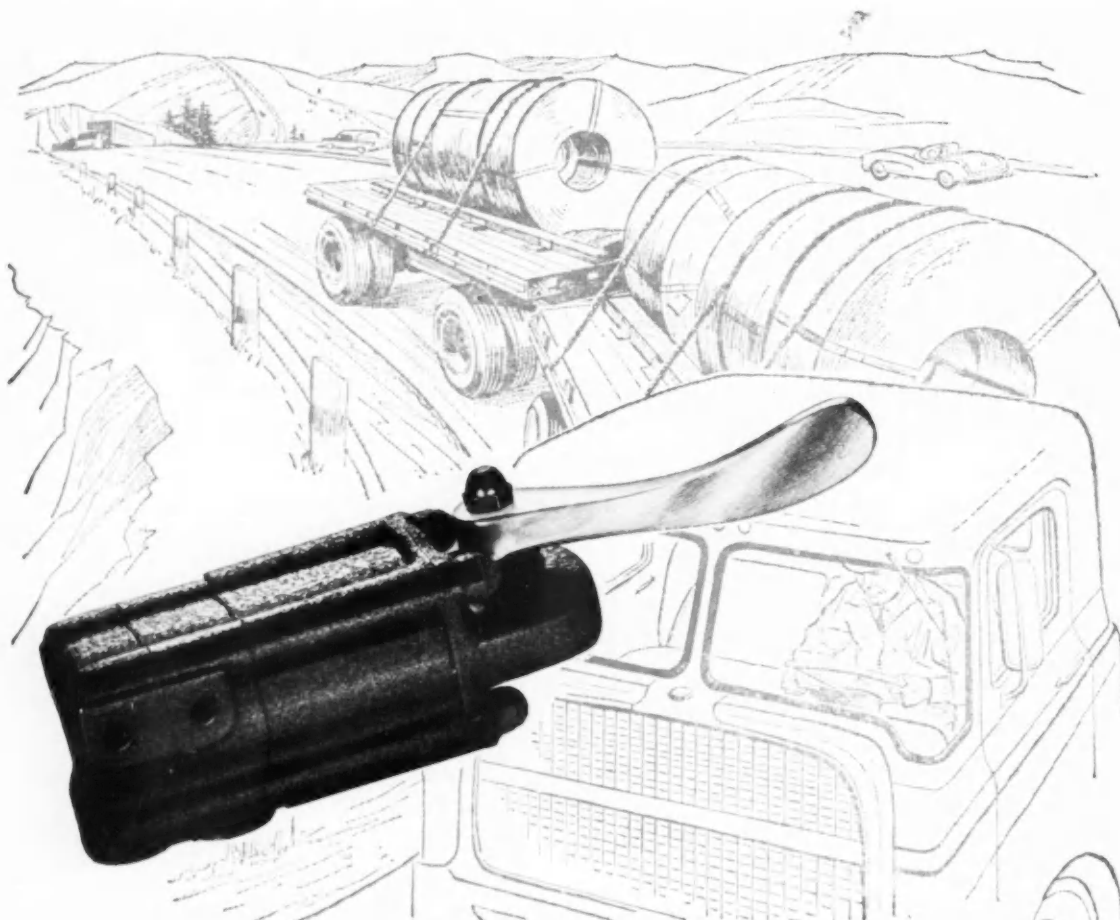


V-8 Automotive Hydraulic
Tappet Application

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Made of light weight aluminum, the new valve weighs only 1½ lbs. And Midland engineers have accelerated the application and release time . . . longer brake and tire life! Drivers have a greater

safety margin . . . through more braking control.

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Owosso Division • Owosso, Michigan



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Take the **HY-PRO "TAP-nology" TEST** and see how you score in selection for savings

HSS 2 flute
spiral point GH 1
Nitride finish

TITANIUM PART
Tap thru hole $\frac{7}{16}$ " deep with #8-32 NC-3 tap in titanium, 40 to 42 Rockwell "C." Lead screw controlled semi-automatic tapping operation.

Which tap would you choose?

HSS 2 flute
spiral point GH 1
special chamfer
Hy-crome finish

The HY-PRO tap designed with special chamfer and Hy-crome finish (right) produced 12.3 times the number of holes per tap obtained with the standard tap with nitride finish.

HSS 2 flute
spiral point
bottoming GH 1
Nitride finish

BRASS PART
Tap blind hole in brass automotive part with #3-48 NC-2 tap. High production automatic tapping operation, 65 pcs. per min.

Which tap would you choose?

HSS 2 flute
spiral point GH 1
modified chamfer
(MR-4)
Hy-crome finish

The HY-PRO MR-4 tap with Hy-crome finish (right) produced 8.2 times the number of holes per tap as obtained with the bottoming Nitride finish tap.

HSS 3 spiral flutes
2 thread chamfer GH 3
Ferrox finish

STEEL RIVET
Tap blind hole in cold forged 1020 steel rivet with $\frac{1}{4}$ -20 NC-2 tap. Part must be free of chips after tapping. Machine tapping operation, 85 pcs. per min.

Which tap would you choose?

HSS 4 flute
bottoming GH 3
Ferrox finish

The new HY-PRO "CR" Series, #307 tap 3 Spiral Flutes (left) produced 4.2 times the number of holes per tap obtained with the 4 flute tap.

Call your local **HY-PRO DISTRIBUTOR**
for standard taps **FROM STOCK**



Did you pick the right taps? If not, just remember similar errors in selection are common among tap users who buy taps by "habit" instead of *comparative performance*.

Today, tap selection is more difficult than ever, with so many new metals, alloys and plastics in industrial use. So be sure that your "TAP-nology" is up to date. Consult your HY-PRO tap engineering specialist. It costs nothing . . . and these examples show how much it can pay off for you. Write: Dept. A.

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NEW BEDFORD, MASS., U. S. A.



MODERN DROP-THROUGH METHOD SPEEDS DIE-CASTING PRODUCTION BY

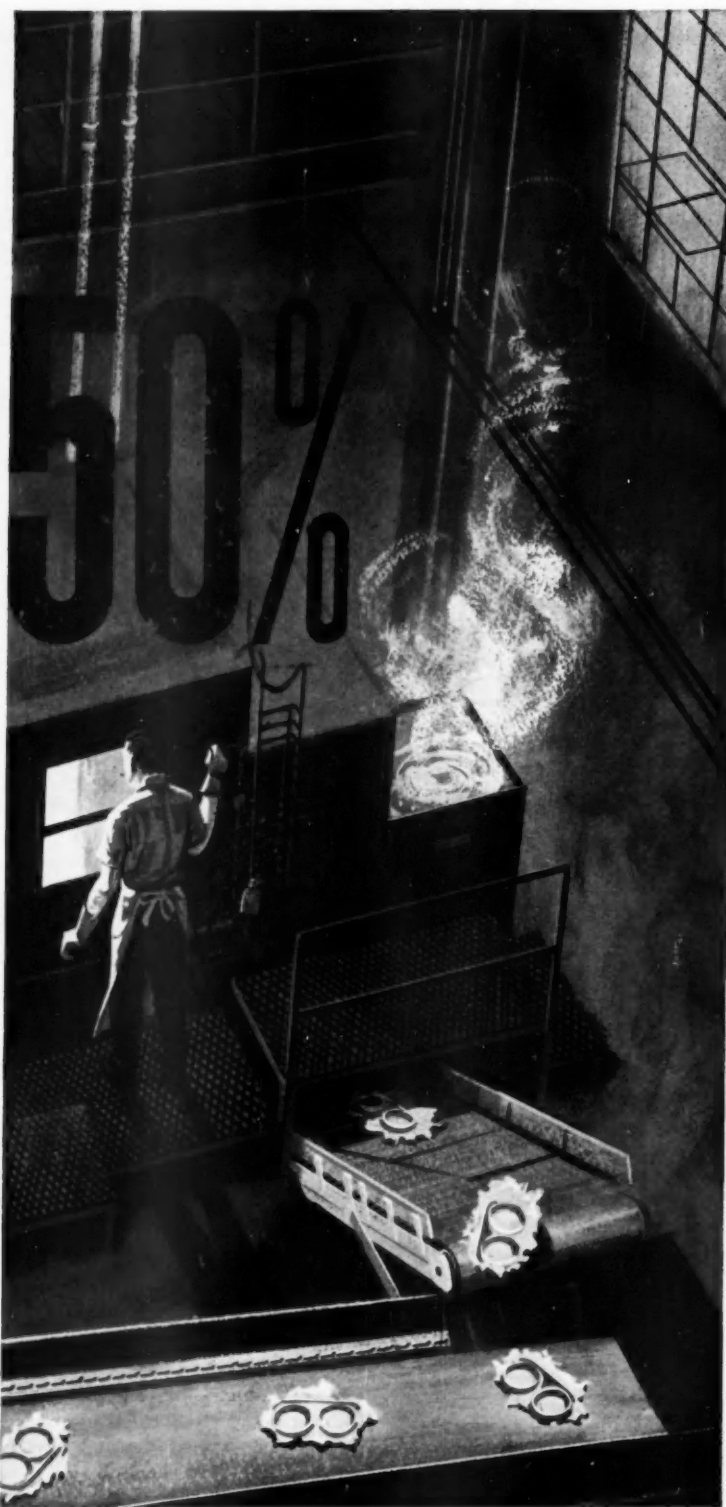
Brown-Lipe-Chapin eliminates manual handling with mechanical ejection of hot die castings.

Here's a typical example of how Brown-Lipe-Chapin engineers put quality into your die cast parts.

After the die casting cycle, castings are ejected automatically into a quench, where a conveyor takes them to the trim press. This modern method of die casting allows a maximum operating rate and boosts the over-all production rate by 50%. Also, casting uniformity is assured because the cycle time is constant and unaffected by operator fatigue or other human factors.

This is just one of the many outstanding features of Brown-Lipe-Chapin die casting facilities that can help make your product better and to more rigid quality standards.

Under the same roof are facilities for metal stamping, anodizing, electroplating, buffing and polishing, precision painting, plus complete engineering service. And two Brown-Lipe-Chapin plants, strategically located in Elyria, Ohio and Syracuse, New York, offer the same complete facilities. For further information, call or write Brown-Lipe-Chapin, Syracuse, New York.



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D I V I S I O N O F G E N E R A L M O T O R S C O R P O R A T I O N



One in a series of technical reports by Bower

BEARING BRIEFINGS

ROLLER GUIDANCE- VITAL FACTOR IN BEARING LIFE

Roller guidance has been established by the Anti-Friction Bearing Manufacturers Association as a major rating factor for roller bearings. There is a direct relationship between this factor and the life and capacity of a cylindrical roller bearing under load.

Figure 1 illustrates the results of a loose fit between a roller and the guiding ribs of the raceway. Because of lack of guidance by the ribs, the roller is free to skew and skid under load. Such a condition invariably leads to early bearing failure.

To achieve close roller fit and proper roller guidance, Bower precision grinds each bearing race on specially designed centerless grinders. In this operation, Bower positions the integral raceway ribs from the theoretical centerline of the bearing. This method produces bearings with high dimensional accuracy and perfect symmetry.

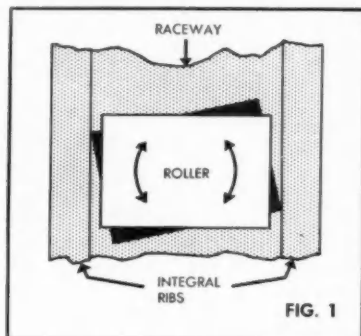
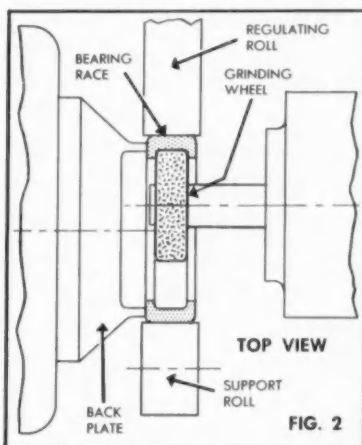


Fig. 1. Loose fit in raceway means poor roller guidance. Roller can skew and skid under load.

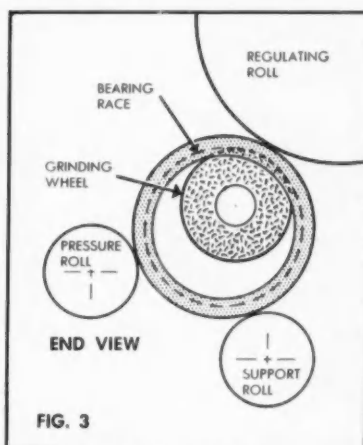
In addition, the close tolerances held in grinding the roller track and integral guiding ribs give Bower cylindrical roller bearings the ability to *take thrust in any direction*. A Bower cylindrical roller bearing has thrust capacity of



from 10-15% of its rated radial capacity!

Figures 2 and 3 diagram the centerless grinding method used to finish Bower raceways. Use of this technique assures not only optimum roller guidance and maximum bearing life, but also virtually eliminates bearing runout. **BEARING SYMMETRY WHICH RESULTS FROM THIS TECHNIQUE PERMITS ACCURATE SHAFT LO-**

CATION REGARDLESS OF HOW THE OUTER RACE AND ROLLER ASSEMBLY ARE INSTALLED. IT COMPLETELY ELIMINATES THE POSSIBILITY OF IMPROPER INSTALLATION.



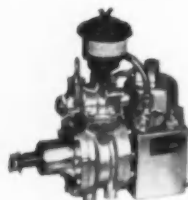
★ ★ ★ ★

Whatever your bearing needs, we suggest you consider the advantages of Bower bearings. Where product design calls for tapered or cylindrical roller bearings or journal roller assemblies, Bower can provide them in a full range of types and sizes. Bower engineers are always available, should you desire assistance or advice on bearing applications.

BOWER ROLLER BEARINGS

BOWER ROLLER BEARING DIVISION — FEDERAL-MOGUL-BOWER BEARINGS, INC., DETROIT 14, MICHIGAN

Use Wagner Air Brake Components to Increase Safety ... Reduce Maintenance!



ROTARY AIR COMPRESSORS have a low temperature air delivery. This prevents carbon formation—reduces fire hazard—lets you use flexible connection in discharge line. Rotary operation provides thousands of overlapping air compression impulses per minute for smoother, quieter operation—increased belt and coupler life.



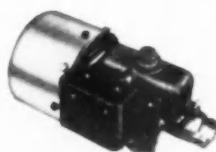
BRAKE APPLICATION VALVES. Hand valve is designed with extra long handle for convenient operation. Gives driver independent control of trailer brakes for smooth stops through entire range of deceleration. Foot application valve meters air smoothly through the range from slow to emergency deceleration—has extra high flow capacity—is light in weight and simple to service.



LOW PRESSURE INDICATOR—buzzer or lamp—warns the driver if air pressure falls below the safe driving range. Warning circuit is controlled by a pneumatic switch which is connected to the pressure side of the air brake system. Unit automatically closes the circuit if pressure drops below a predetermined value.



BRAKE CHAMBERS have fully oil-resistant diaphragms of nylon and neoprene to provide much better wear characteristics—less deterioration. All metal parts are of corrosion-resistant material, or are plated to prevent corrosion. Diaphragms are interchangeable—will fit in other makes of brake chambers.



POWER CLUSTER converts 100 p.s.i. of air pressure into approximately 1500 p.s.i. of unvarying hydraulic pressure. Gives much more uniform metering control than "booster" type hydraulic units. Provides power actuation through the entire range of braking and, in connection with our application valve, gives "low pedal" hydraulic brake operation.



MOISTURE EJECTION VALVE prevents moisture accumulation in the air tank. It is fully automatic, operating in the 15-25 p.s.i. pressure range. Normal brake applications operate the valve, keeping reservoir clean and moisture-free. Expulsions occur without a notable drop in gauge pressure.



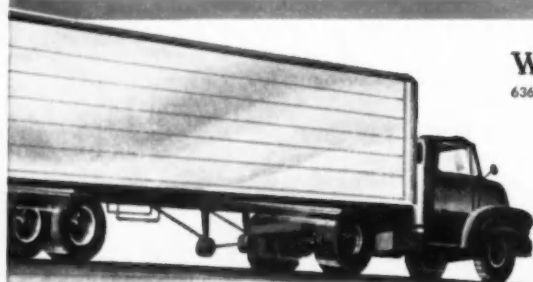
TRACTOR PROTECTION and EMERGENCY BRAKE VALVES for combination vehicles—provide manual and fully automatic protection. In emergency they can be triggered by pulling the valve knob—however, the fully automatic units will activate without driver attention in any emergency due to trailer break-away or air loss failure.



RELAY QUICK-RELEASE VALVE controls the brakes on specific axles, acting in unison with the driver-controlled application valves. Automatically meters pressure directly from a reservoir tank, speeding normal braking and release. Low differential between input and output pressures provides better balanced braking actuation.

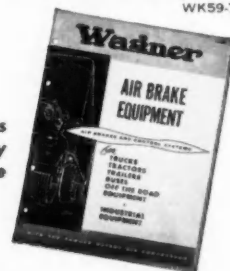


ALCOHOL INJECTOR keeps air lines and air reservoir free of ice. Connects to the discharge side of the compressor—does not contaminate the oil. Is of all-metal construction—no glass to break. Has extra large capacity—requires less frequent refilling.

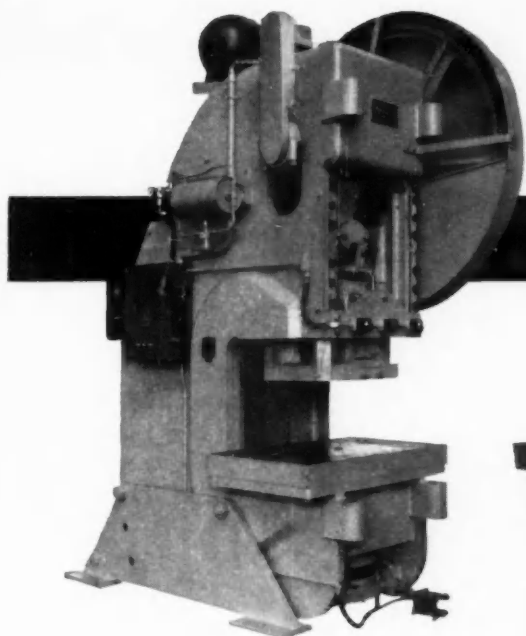


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6363 PLYMOUTH AVENUE, ST. LOUIS 33, MO., U. S. A.

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described in Catalog KU-201. Write
for your copy today.

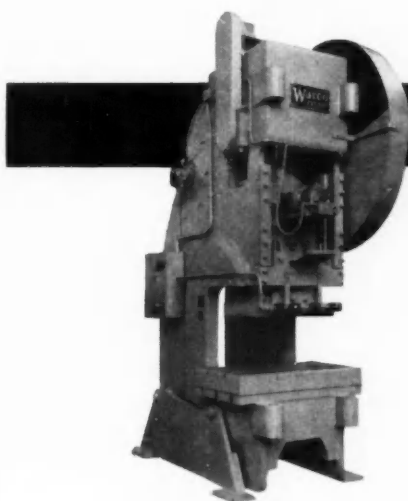


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200-ton standard

Warco®

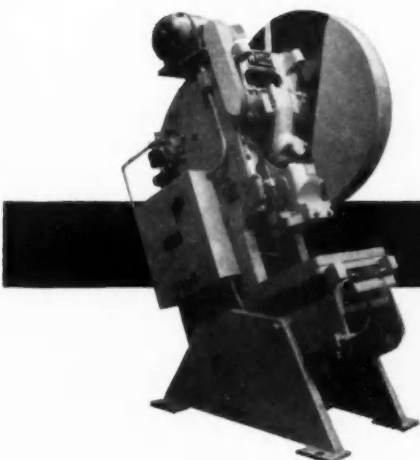


150-ton with power slide adjustment

the OBI line with the built-in extras...

Warco—Quality Press Line—gives you *all* these "extras" in an OBI press: welded steel frame of plate much stiffer than cast iron or Meehanite; pneumatically operated combined friction clutch and spring-loaded brake; saddle type connection; long, hand scraped gib ways; heat treated crankshaft; high grade steel gears with heat treated pinions; and rotary type limit switches for press control.

Before you buy any OBI, compare and you'll buy Warco. They're available in capacities from 40 to 200 ton.



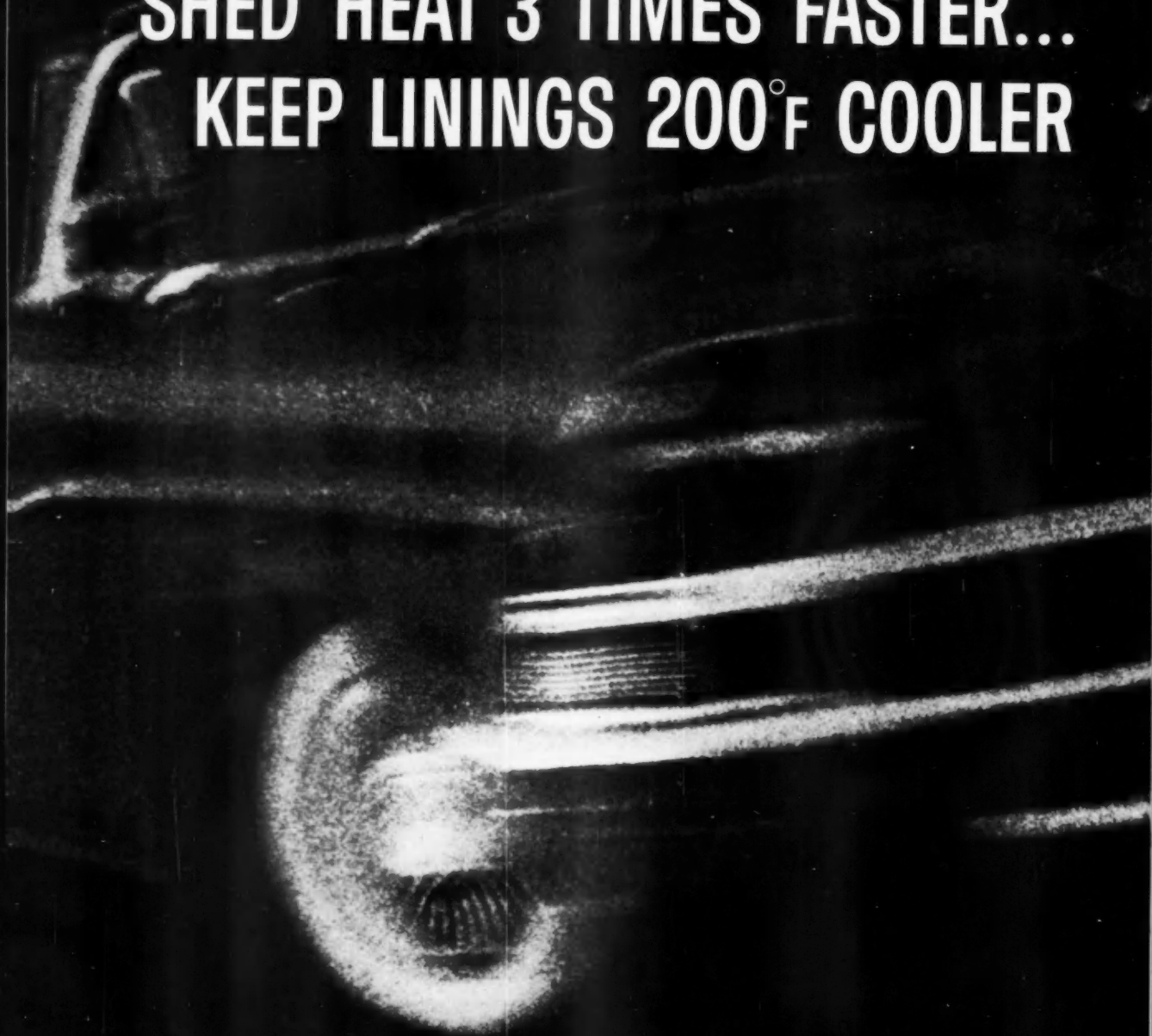
60-ton standard QBI inclined position

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PRESSES®

**ALUMINUM BRAKE DRUMS
SHED HEAT 3 TIMES FASTER...
KEEP LININGS 200°F COOLER**





Aluminum-Silicon Alloy Brake Drum

High-silicon aluminum alloy brake drum now undergoing advanced development and testing. Evaluations show good machining, braking surface condition and braking effectiveness.

FOR SAFER, SURER STOPS

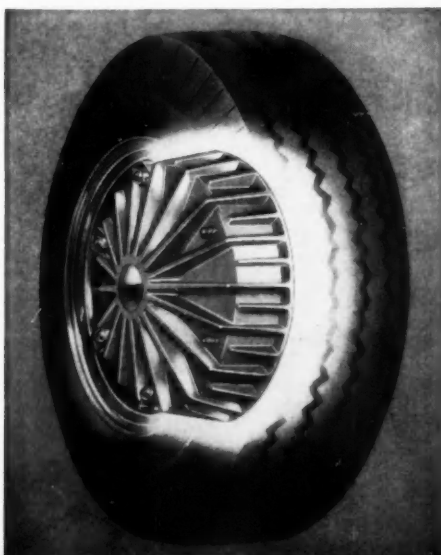
Confronted with design and performance factors that impair brake performance in the newer automobiles, engineers are turning to aluminum and Alcoa for a solution.

Objective: To come up with a brake drum that soaks up heat faster—throws it off faster, as well. Solution: Aluminum, with its high thermal conductivity, not only licks the critical problem of heat dissipation, but it also provides a half dozen other important advantages. Aluminum brake drums have now been standard front-end equipment, proven superior, in one major American automobile and several foreign makes for the past two years. Here's why—

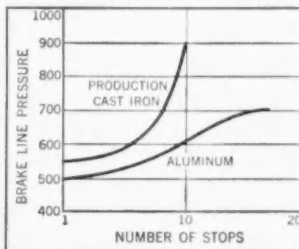
Lower Operating Temperature—Compared to the production cast-iron type, aluminum drums dissipate heat three times faster to reduce brake lining temperatures by 200°F. As a result, fading is substantially reduced or eliminated, brake linings last longer, and other vital parts are protected against the threat of destructive temperatures. With lower operating temperatures come greater stability, faster recovery and freedom from rough, erratic action.

Less Weight, Better Styling—Aluminum brake drums can weigh as little as half as much as the comparable cast-iron type to reduce front-end weight. The designer's metal, versatile aluminum opens new avenues of styling possibilities. Fins and other functional or styling features may be incorporated into the aluminum brake drum.

Let Alcoa Help—Many leading manufacturers have teamed up with Alcoa's Development Division Laboratories in the exploration of new and better aluminum automotive components. The most experienced producer of aluminum in the world, Alcoa offers skilled engineers and unmatched facilities for valuable assistance to you. Bring your design and application problems to Alcoa. Write Aluminum Company of America, 1786-L Alcoa Building, Pittsburgh 19, Pennsylvania.



**50-MPH FADE TEST
ON AUTOMOBILE BRAKES**
Production Cast-Iron Brake Drum
vs Aluminum Alloy Brake Drum



Integral Aluminum Hub and Drum Assembly

New design provides maximum exposure to air stream and optimum heat radiating area. Drum back is structural component of wheel and contributes to functional styling.



**ALCOA ALUMINUM GIVES EVERY
CAR MORE GLEAM AND GO**

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Why Chrysler chose Purolator filtration for its new Valiant...



Purolator supplies both the air filter and oil filter for Chrysler's dramatic new Valiant. One important reason: Chrysler has proved that Purolator gives superior performance. • Compactness is another important reason. The Micronic[®] oil filter, for example, is more compact because Purolator puts lots of effective filter area into a small volume. It suits the Valiant to a T—permits more efficient use of the smaller space under the hood. • There are many other reasons why Chrysler chose Purolator filters, of course, and why it may profit you to investigate Purolator filtration. Just write and ask.

*Filtration
For Every Known
Fluid*

PUROLATOR
PRODUCTS, INC.
RAHWAY, NEW JERSEY AND TORONTO, ONTARIO, CANADA



*Independent quadrilateral suspension
by Mather about 300 B.C.*

**LET
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SOLVE
YOUR
SUSPENSION
PROBLEMS,
TOO**

The suspension "techniques" applied to this and the conveyances illustrated in our preceding advertisements* can quite properly be termed "far fetched". But, even though somewhat ridiculous, they are based on sound principles.

For the past 50 years Mather has concentrated its resources on the development and advancement of "ridability". So . . . if you have a problem or a project and would like to take advantage of our research, engineering and design facilities, please call CH 3-3201 or write,

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NATIONAL LOCK COMPANY
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*
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FITZGERALD
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 Steel and Asbestos
GASKETS
end costly
 gasket failures

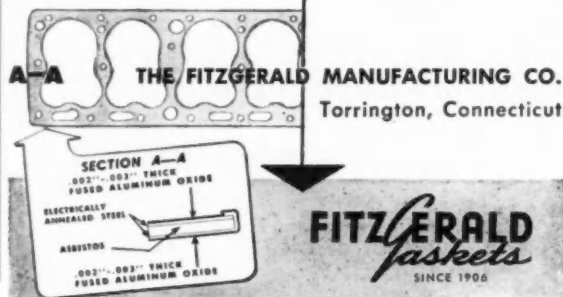
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 gasoline or diesel.

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 Gasket for Every Engine

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Cork Gaskets

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 Gaskets for oil, gasoline
 and water connections



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WHITE'S new 5400 Super Hauler

has everything designed for lightweight ruggedness including a 9-speed transmission by Clark

Just introduced to the American trucking industry, White's new 5400 Super Hauler sets a new high in tractor design. In a cab only 50 inches long, components are of strong, light fiberglass, aluminum, and chrome-manganese steel. Offered as standard equipment, its power train includes the efficient new Clark 9-speed transmission.

This transmission makes a major contribution to the Hauler's light weight and safe easy handling. With all major castings made of aluminum, weight savings of approximately 200 lbs result over comparable transmissions. Its offset drive minimizes propeller shaft angularity, permits the close-coupled tractor and from 1 ft to 4'4" more payload room. Fingertip air-assist removes most of the effort of gear shifting, yet retains feel; driver is in complete control at all times. Thus fatigue is reduced, safety increased, and because Clark's power-assist shift needs no extra air tanks, costs and weight are further reduced.

Drive the new White 5400 with its new Clark 9-speed transmission and you'll see what we mean.

Other Clark transmissions are available for tractors and trucks in a wide range of capacities. Write for full details.

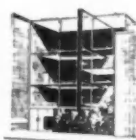


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CLARK EQUIPMENT COMPANY
AUTOMOTIVE DIVISION
Falahee Road, Jackson 2, Michigan

AUTOMOTIVE INDUSTRIES

A CHILTON



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FREE LITERATURE

Bearing Screw 1

An informative booklet concerning a new antifriction screw has been published. It is designed to acquaint you with the principle of operation, and the many various uses of this unit. It is adaptable to many phases of both the automotive and industrial fields. *Roton Products, a div. of the Anderson Co.*

Safety Starter 2

Six safety features of Westinghouse Type L combination safety starters are discussed in a booklet entitled "Industry's Safest Line of Combination Starters." Type L starters are used to control industrial equipment such as heavy machine tools. *Westinghouse Electric Corp.*

Welding Equipment 3

A 12-page bulletin, giving condensed specifications of all P & H transformers, rectifier and rotary d-c welders is offered by *Harnischfeger Corp.*

Radio Isotopes 4

A 12-page booklet, "Industrial Radiography With Radioisotopes," describes a line of equipment and methods of radiographing all kinds of industrial products. *Pickar X-Ray Corp.*

Multipress Line 5

An illustrated four-page catalog on the Denison press line has been published. The brochure gives general data on the entire line, including presses available in capacities of from 1 to 12 tons. *Denison Engineering Div., American Brake Shoe Co.*

Connectors 6

A new catalog sheet describing a line of high temperature connectors is now available. This technical bulletin points out the types of applications for which the connectors were designed. It also offers information regarding standard sizes, types, contact patterns, MS cross reference numbers and insert data. *Harco Laboratories.*

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FREE LITERATURE—Continued

Power Plants 7

A new eight-page price list covering a complete line of gasoline and diesel electric power plants has just been issued. *Universal Motor Co.*

Heat Processing 8

A booklet concerning heat processing equipment is now available. This literature gives a brief outline of both custom engineered installations, and "catalog" equipment. It is intended to serve as a guide to the capabilities and manufacturing skills of the *Dispatch Oven Co.*

Vertical Cut Off Saw 9

A bulletin has been published describing a new vertical cut off saw. This machine cuts up to 7 in., burr free lengths; and is said to cause no distortion in narrow walled tubing. *The National Copper and Smelting Co.*

Flexible Metal Hose 10

A catalog describing flexible, metal and synthetic rubber hose is now available in 12 pages. It illustrates both the right and wrong way of installing and using flexible hose. *Flexonics Corp.*

Four Wheel Drive 11

A new brochure details the features of a lift truck equipped with four wheel drive. These trucks are in the 15,000 to 20,000 lb capacity range. *Hyster Co.*

Hand and Power Winches 12

A catalog describing features and capacities of a complete line of winches is now offered. Both spur and worm gear models are included. *Therm Machine Co.*

Turret Drilling 13

A new booklet of case histories of applications on turret drilling is now available. This compilation of typical applications details tooling employed, and documents operating time required. *Brown and Sharpe Mfg. Co.*

Air Hydraulic Boosters 14

A new 24-page bulletin describes how air hydraulic boosters convert shop air into intensified hydraulic pressure for operating hydraulic cylinders and other devices. *Miller Fluid Power Div., Flick-Reedy Corp.*

Roller Bearings 15

New HJ series roller bearings, featuring one piece cage design, are described in detail in catalog 359 now available from *The Torrington Co.*

Axial Piston Pump 16

A bulletin describing Vickers new 5000 psi axial pump, designated model A-12900 series, is offered. Besides capacity data, this bulletin contains information on size, weight, horsepower, control features and design characteristics. *Vickers, Inc., a Div. of Sperry Rand Corp.*

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FREE LITERATURE— continued

Carbon Steel Bars 17

A revised bulletin containing additional information on types of leaded steel bars is now available. Stock sizes of over 20 different kinds of cold finished steel bars, and data on workability are given. *Joseph T. Ryerson and Son, Inc.*

Motion Control Sheave 18

A bulletin describing variable speed sheaves has been offered. It contains information describing the resilient cam-follower design that eliminates freezing and sticking. *T. B. Wood's Sons Co.*

Abrasive Finishing 19

A new data sheet covering abrasive finishing of brass and bronze is offered. The sheet gives complete information on wheel heading, lubrication, surface speed and recommended types of buffs. *The Lea Mfg. Co.*

Multi-Button Switch 20

New literature is available describing a new line of four and six station switches. All features are described and illustrated by an "X-ray" type of overlay. *Joy Mfg. Co.*

Airborne Hydraulic Pump 21

A new booklet features a variable displacement, two stage hydraulic pump. It describes the two stage principle of operation, and provides information on operating characteristics. *American Brake Shoe Co.*

Bar Stock and Shapes 22

An informative booklet shows how bar stock, bushings, and shapes are cast in standard sizes to be used for cams, pistons, gears, plates, and parallels. *Meehanite Metal Corp.*

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Finishing Systems 23

An illustrated index of the complete finishing systems by DeVilbiss is now available. Included are spray guns, flow and dip coaters, spray booths, industrial power washers, and many other fine and interesting items. *The DeVilbiss Co.*

Chucking Devices 24

A circular on precision chucking devices is available. These devices are produced in sizes from 8 to 50 in. Other sizes can be produced to meet specific requirements. *Pratt and Whitney Co., Inc.*

Holding Tools 25

A line of work holding tools is described and illustrated in a comprehensive catalog prepared by the *Chicago Tool and Engineering Co.* The devices are designed for production, tooling, maintenance, and have wide applications throughout industry.

Engine Catalog 26

A 12 page, three color catalog describing International six cylinder interchangeable diesel and carbureted engines has been issued by the *International Harvester Co.*

Tool and Die 27

Two new catalogs are offered for the 1960 line of metal working tools, and the punch and die series. This catalog covers the new rod cutter, and bending brake line; die shoes, punch holders, strippers, and die holders. *Whitney Metal Tool Co.*

Spring Loaded Pulleys 28

Booklets giving data and capacities of a new pulley line are offered. The new equipment is described and illustrated in a four page catalog designated SL-1. *Service Div. Maurey Mfg. Co.*

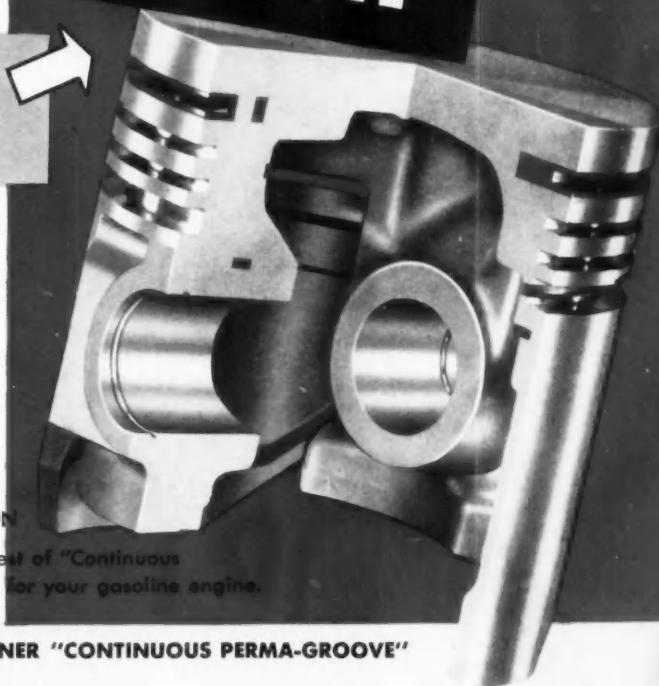
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